A WORKBOOK FOR

Arithmetic We Need

L
BROWNELL
SAUBLE

1

Large Numbers in the News

A

University Gifts Reported

The local University reports a total of $1,278,952 received in gifts during the past year.

C

Stamp Auction Well Attended

Largest single sale at the Stamp Collector's Auction was the famous Brown collection of more than 367,000 stamps.

E

United Charities Appeal

This year's goal is set at $1,230,000. Be ready to give generously in this good cause.

B

Advt. **FIRE SALE!** *Advt.*

TV Sets

Entire stock of TV sets, valued at $80,000, to be sold at great reductions. From burned warehouse, but sets not damaged.

D

Order Your *SATURDAY COURIER* Now

Last week's issue (42,000) of the *Saturday Courier* was not enough to fill the demand. Order your copy saved for you.

F

APPLE BLOSSOM TIME AGAIN

An estimated 750,000 people will drive through our lovely Blossom Valley to see the apple trees in their first bloom.

Miss Day asked the class to look for large numbers in newspapers and magazines. The clippings shown above are some of the ones which the class found.

After each pupil had cut out at least two clippings, Miss Day mixed up the clippings. She asked each pupil to draw two and explain the meaning of the numbers in them.

1. Write in words each number in the clippings above.

A. $1,278,952 _____

_____

B. $80,000 _____

C. 367,000 _____

D. 42,000 _____

E. $1,230,000 _____

F. 750,000 _____

2. For $1,278,952, write the figure that is in

a. one's place: ____

b. ten's place: ____

c. million's place: ____

d. hundred's place: ____

e. hundred-thousand's place: ____

f. ten-thousand's place: ____

Complete the following statements:

1. The 1-place number 9 means ___ ones.

2. If we add 20 to 9, the sum is _____.

3. In 20 there are ___ tens, so the number 29 means ___ tens and ___ ones.

4. If we add 500 to 29, we have _____.

5. From Ex. 1–4, we see that the number 529 is made up of

____ hundreds and ____ tens and ____ ones.

6. The number 27,529 is made up of 27 _____ and 5 _____ and 2 _____ and 9 _____.

We read 27,529 as "twenty-seven thousand five _____ twenty-_____."

7. Another way to explain the number 27,529 is to show that it is made up of five products. Complete the table below.

27,529 is made up of

$2 \times 10{,}000 = 20{,}000$

$7 \times 1{,}000 =$ _____

$5 \times$ _____ = _____

____ $\times$ _____ = _____

$9 \times$ _____ = _____

The sum is _____

8. Copy the numbers in the box below with the figures in the proper places to show what each figure means.

Value of Place → / Number ↓	Hundred thousand	Ten thousand	Thousand	Hundred	Ten	One
a. 27,529						
b. 2,997						
c. 832						
d. 40,675						
e. 156,488						
f. 320						

9. There are many ways of taking a number apart to show what it means. Complete the statements below, which tell the meaning of the number 27,529 in five different ways.

27,529 means

_____ thousands and ____ hundreds and ____ tens and ____ ones,

or _____ hundreds and ____ tens and ____ ones,

or _____ hundreds and _____ ones,

or _____ tens and ____ ones,

or _____ ones.

10. Explain the meaning of the figure 4 in a–c below.

a. In 3,543, the 4 means 4 _____, or 40.

b. In 3,504,319, the 4 means 4 _____, or _____.

c. In 4,100,325, the 4 means 4 _____, or _____.

Reading and Writing Larger Numbers

[*Through billion's period*]

Value of Place →	Hundred billion	Ten billion	Billion	Hundred million	Ten million	Million	Hundred thousand	Ten thousand	Thousand	Hundred	Ten	One
Value of Period →			Billion			Million			Thousand			One
a.					9	2,	8	9	7,	4	1	6
b.			2,	3	9	8,	0	0	0,	0	0	0
c.												

1. Number a, above, tells the average distance in miles of the earth from the sun during its rotation. Write the words you say when you read 92,897,416.

2. In 92,897,416 there are ___ figures, each with its own place value, and _____ periods. The periods are *one's* _____, _____, and _____.

3. Number b in the box above is read: "*Two billion* _____ *million*."

4. Write the following numbers in figures:

a. Fifty-six thousand two hundred sixty.

b. One hundred forty million six hundred twenty thousand three hundred three.

c. One billion one hundred twenty-six million one hundred thousand two hundred nineteen.

5. In a recent year, United States airlines flew 15,548,247,000 passenger miles. Write this number in the box, beside c.

If you are not sure where to start writing this number, say the periods, beginning with one's period, as follows:

000 means ones; 247 means _____; 548 means _____; so 15 is in _____ period. The 5 should be written in billion's place, and the 1 in _____ place.

6. Look at Ex. 4 again. Underline the words that name the periods.

Which period is not named by the printed words?

_____

7. $10 = 10 \times$ ____; $100 = 10 \times$ _____; $1{,}000 = 10 \times$ _____; $10{,}000 = 10 \times$ _____. As we move to the left in a number, the value of each place is _____ times the value of the previous place.

8. Put commas in the following numbers to show the periods:

a. 82653147	c. 7065320
b. 139428	d. 51074931

9. Copy the number in Ex. 8 that has

a. 9 in hundred's place. _____

b. 653 in thousand's period. _____

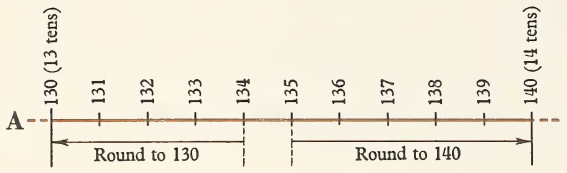
c. 5 in thousand's place. _____

d. 13 ten thousands. _____

Round Numbers

If there are 194 pupils in Grade 6, we can say that in round numbers there are about 200 pupils.

Number line A, below, will remind you about rounding numbers.



1. Rounded to the nearest ten, 131 is called _____, because 131 is nearer to _____ than to _____.

2. 135 is exactly halfway between 130 and 140. By the rule we follow, 135 is rounded to the next larger ten; so 135 is rounded to _____.

Round each of the numbers below to the nearest ten.

3. 132 _____ **6.** 128 _____

4. 129 _____ **7.** 144 _____

5. 143 _____ **8.** 127 _____

9. Number line B, below, shows the whole numbers from 110, or _____ tens, to _____, or _____ tens.

10. Study number line B. Which numbers between 110 and 120 would be given as 110, when rounded to the nearest ten?

_____

11. On number line B, circle each number from 110 to 130 which, to the nearest ten, would be rounded to 120.

12. When you round 836 to the nearest hundred, you *think*, "836 is nearer to _____ hundred than to _____ hundred, so 836 is rounded to _____." You notice especially the _____'s figure, 3; you do not have to notice the one's figure.

13. Round to the nearest hundred:

683 _____ 7,261 _____

429 _____ 35,738 _____

14. Round to the nearest thousand:

2,199 _____ 79,625 _____

8,507 _____ 132,479 _____

15. Round to the nearest million:

31,275,859 _____

8,076,742,108 _____

You have to use good sense about when to round a number and how far to round it.

16. Suppose your train leaves at 19 minutes before 3 o'clock and you write the time in round numbers as 20 minutes of 3. Is this a good way to round 19?

_____

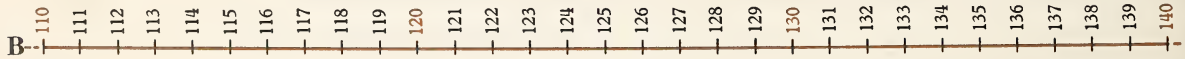
If the train leaves at 22 minutes of 3, is it a good idea to round the time to 20 minutes of 3?

_____

17. If you need exactly 73 inches of molding for a picture frame, and you round 73 to the nearest 10, how many inches will you get?

_____

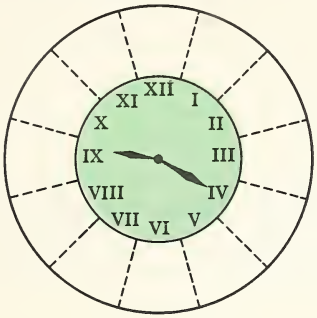
Is this a good way to round 73? _____



Roman Numerals

Roman number symbols:	I	V	X	L	C	D	M
Arabic number symbols:	1	5	10	50	100	500	1,000

1. On this clock, the hour hand has passed nine; the minute hand points to _____. The time is _____ minutes past ____ o'clock.



2. Write the hours in Arabic numerals around the edge of the clock.

Writing numbers with Roman numerals is something like making change. You take a number apart and then use the Roman number symbols like coins to build up the right amount.

3. Show why 68 is written as LXVIII.

Think, "68 = 50 + 10 + 5 + 1 + 1 + 1"; write, "LX_____."

To check, look at the Roman numerals that you wrote and count "50, 60, _____, _____, _____, _____."

In Ex. 3, the values of all the letters used are added from left to right.

Besides the single letters, there are six subtracting pairs of letters in the Roman system of notation. In using these subtracting pairs to help us build up larger numbers, we think of each pair as a single number and add its value to the values of the other letters.

Ex. 4–9 show how to think with the six subtracting pairs of letters.

4. IV = V − I, or 5 − 1, or ____.

5. IX = X − I, or 10 − 1, or ____.

6. XL = L − X, or 50 − 10, or _____.

7. XC = C − X, or 100 − _____, or _____.

8. CD = D − C, or 500 − _____, or _____.

9. CM = M − C, or 1,000 − _____, or _____.

10. Write with Roman numerals:

a		b	
10 =	_____	100 =	_____
20 =	_____	200 =	_____
30 =	_____	300 =	_____
40 =	_____	400 =	_____
50 =	_____	500 =	_____
60 =	_____	600 =	_____
70 =	_____	700 =	_____
80 =	_____	800 =	_____
90 =	_____	900 =	_____
100 =	_____	1,000 =	_____
4 =	_____	6 =	_____
9 =	_____	11 =	_____
40 =	_____	60 =	_____
90 =	_____	110 =	_____
400 =	_____	600 =	_____
900 =	_____	1,100 =	_____

More about Roman Notation

1. The seven letters used in the Roman system of notation are as follows:

I = ____ V = ____ X = ____ L = ____

C = _____ D = _____ M = _____

2. Remember the way to write and to read Roman numbers! In general, values of the letters are _____ from left to right; and when one of the subtracting pairs is used, we think of it as a single number and _____ its value to the other values.

3. Tom wrote 49 as XXXXVIIII. Show how Tom took 49 apart.

_____

In Roman notation, we should use the smallest possible number of letters.

Think, "49 = 40 + ____. In Roman notation, 49 = _____."

4. Jed, Marge, and Sally read XXIX in three ways. Cross out the wrong ways.

Jed: XXIX = X + X + I + X = 31

Marge: XXIX = X + XI + X = 10 + 11 + 10 = 31

Sally: XXIX = X + X + IX = 10 + 10 + 9 = 29

5. Write in Roman notation:

84 _____ 192 _____

516 _____ 406 _____

709 _____ 969 _____

1,251 _____ 614 _____

6. Write three Roman numbers, using the three letters I, X, L in each. Then write them in Arabic notation.

_____ = _____ _____ = _____

_____ = _____

7. The last chapter in a book was numbered XXVIII. There were _____ chapters in the book.

Number Tricks and Puzzles

[*Using Roman numerals*]

1. Draw a dotted line in this Roman numeral to make half of ten become five.

X

2. Can you make it look as if half of nine is four? _____

3. Make half of twelve become seven.

XII

4. What number becomes ten more when ten is taken away from it? _____

5. What number is one greater when one is taken away from it?

_____

6. Take one hundred from four hundred and leave five hundred. _____

7. Write SIX and take away nine. On the same line, write nine and take away ten. Then write forty and take away fifty. Show that you have SIX left!

_____

A Review of Addition

1. Sue has saved 4 box tops, and Ann has saved 3. Together, they have ____ box tops.

Adding is quicker and easier than counting. The work on this page and the following pages will help you to find out how well you remember the things that you have learned about addition.

2. In the addition $7 + 29 = 36$, the numbers 7 and 29 are called the _____; 36 is the _____.

3. Only things that are _____ in some way can be added. In order to add 5 carnations and 9 roses, we must think of them all as _____.

4. $4 + 7 = 11$ is an **addition fact.** If you know the fact $4 + 7 = 11$, you also know its reverse, $7 + \_\_\_\_ = \_\_\_\_$.

5. In the space below, draw a dot picture to show how you would add 8 and 6 by first making a ten.

The sum is _____.

[*Addition facts*]

First say the answers. Then write the sums.

	a	b	c	d	e	f
6.	2 + 2	0 + 1	4 + 5	9 + 0	6 + 5	1 + 8
7.	1 + 1	4 + 7	0 + 0	5 + 8	8 + 3	6 + 9
8.	3 + 5	9 + 4	1 + 0	6 + 7	4 + 8	4 + 2
9.	9 + 7	2 + 0	6 + 4	1 + 2	5 + 4	0 + 2
10.	8 + 6	7 + 7	3 + 8	1 + 9	2 + 4	3 + 0
11.	7 + 5	8 + 8	7 + 9	5 + 0	8 + 1	3 + 3
12.	5 + 1	4 + 6	8 + 5	6 + 6	5 + 9	4 + 0
13.	2 + 9	8 + 7	1 + 3	0 + 5	3 + 6	5 + 5
14.	1 + 7	8 + 2	7 + 6	1 + 5	9 + 9	0 + 7
15.	6 + 3	7 + 1	2 + 6	0 + 3	7 + 4	6 + 8
16.	2 + 3	9 + 1	0 + 4	3 + 7	2 + 5	4 + 1
17.	6 + 0	8 + 9	3 + 2	2 + 1	1 + 6	7 + 2

Addition Families

[*Higher-decade A.; without and with carrying*]

The facts below are all part of the $3 + 4$ family. If you know $3 + 4 = 7$, you can quickly write the other facts in this family. Finish the additions below.

1.

3	13	3	53	83	3
+4	+4	+34	+4	+4	+64
7	17	37			

2. Write four other facts in the $3 + 4$ family. Be sure to include the answers.

Write the numbers that will make the following belong to the $3 + 4$ family:

3.

3	3	63	_____
+_____	+_____	+____	+_____
57	47	67	77

4. In each fact in the $3 + 4$ family,

a. the figure in one's place in the sum is _____; **b.** the ten's figure in the sum is the same as the _____ figure in the larger addend, because the sum of the figures in one's column is less than _____.

Finish these facts in the $8 + 6$ family:

5.

8	18	8	58	48
+6	+6	+36	+6	+6
14	24	?!		

6. $8 + 6$ = _____, or ___ ten and ___ ones; so in the $8 + 6$ family you always have ___ ten to carry to the _____ column. This makes the ten's figure in the sum ___ more than the ten's figure in the larger addend.

The facts in these addition families are the kind you must use often in column addition and in multiplying. Here is a chance to get practice that will help you.

	a	b	c	d	e
7.	2	59	42	4	68
	+37	+5	+4	+19	+9
8.	45	9	17	28	38
	+7	+23	+2	+8	+5
9.	9	27	73	3	36
	+14	+5	+6	+57	+3
10.	57	42	35	26	85
	+6	+5	+9	+8	+2
11.	37	56	69	44	73
	+9	+4	+9	+8	+8

Number Tricks and Puzzles

1. In adding, would you say, "6 and 7 **is** 11" or "6 and 7 **are** 11"?

_____

2. This is a very old rhyme:

> Every lady in the land
> Has 20 nails upon each hand
> Five and twenty on hands and feet
> And this is true without deceit.

See if you can punctuate this rhyme so it can be read sensibly.

Column Addition

[*Order in adding; 1-place addends*]

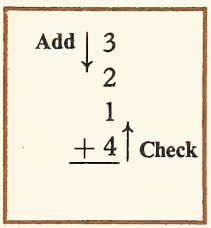
1. The same addends are used in each of Ex. **a–d** below, but they are added in a different order each time. What is true of the sums?

---

a.	**b.**	**c.**	**d.**
5	9	3	4
3	4	4	3
4	5	9	5
+9	+3	+5	+9
21	21	21	21

We may add groups or numbers in any order.

2. In the box, adding downward, look at 3 and 2 and *think*, "____." Remembering this sum, 5, look at 1 and *think*, "____." The last two numbers to be added are ____ and ____. Write the final sum in the box.



3. To make sure that the sum in the box is right, check by adding upward.

Think, "5, _____, _____." Is the sum right?

Add downward in rows 4–6. Check by adding upward.

	a	**b**	**c**	**d**	**e**	**f**
4.	2	3	5	8	2	3
	4	1	2	1	7	3
	+5	+4	+7	+6	+1	+4
5.	4	2	3	6	4	2
	2	5	0	2	2	0
	2	0	4	1	0	3
	+5	+4	+5	+6	+7	+6
6.	4	5	4	7	3	3
	1	2	0	0	4	5
	4	1	5	2	2	0
	+3	+4	+4	+7	+3	+4

Number Tricks and Puzzles

	a	**b**	**c**
d	4	9	2
e	3	5	7
f	8	1	6

1. Find these sums:

Column **a**: ____

Column **b**: ____

Column **c**: ____

Row **d**: ____ Row **e**: ____ Row **f**: ____

Diagonal from **a**: $4 + 5 + 6 =$ ____

Diagonal from **c**: $2 + 5 + 8 =$ ____

What do you notice? _____

2. Write the numbers used in the square in order, beginning with the smallest.

---, ---, ---, ---, ---, ---, ---, ---, ---.

What do you notice about these numbers?

This "magic square" was discovered many years ago in China. Both the square and the number 15 were used as good-luck charms in Eastern countries.

Adding Larger Numbers

[*With carrying*]

1. To add the numbers in box A, we can separate them into their parts as in box B and then add the parts.

Finish the adding that is started in box B. Then put the sums together to find the final sum. Write this sum in box B.

A

$$\begin{array}{r} 4,581 \\ 796 \\ +1,835 \\ \hline \end{array}$$

B

4,000 and	500 and	80 and	1
	700 and	90 and	6
+1,000 and	800 and	30 and	5

5,000 and _____ and _____ and _____

= _____

2. Now find the sum in box A.

3. Complete the following sentences to show how you added in box A:

a. You find the sum in _____ column first. The sum of the ones is ____, so you write "____" in one's column in the sum and carry ____ ten to ten's column.

b. When you find the sum of ten's column, you write "____" and carry ____ hundreds to _____ column.

c. In hundred's column, you *think*, "7, _____, _____." You write "____" and carry ____ thousands.

d. There are ____ thousands in all.

In adding, write ones in the sum under ones, tens under tens, and so on. Carry 1 or more to the next column when the sum is 10 or more.

Add downward and write the sums. Then check by adding upward. Write your check sums on the dashed lines above the examples.

	a	b	c
4.	3,182 654 +97	753 985 +585	6,895 978 +2,837

Here is a short review of some of the number facts you use very often in column addition. Write the sums quickly.

	a	b	c	d	e	f
5.	5 +7	1 +8	2 +6	5 +5	8 +7	9 +8
6.	9 +3	4 +7	6 +8	7 +6	5 +8	9 +9

Remember: Addition families help you in column addition. Write the sums.

	a	b	c	d	e
7.	24 +8	3 +18	45 +9	8 +32	7 +19
8.	32 +9	61 +5	4 +29	28 +8	30 +7

Add downward in row 9. Add upward to check, and write the check sum on the dashed line above each example.

	a	b	c
9.	3,063 124 7,361 +550	694 251 332 +873	9,286 341 914 +2,620

Meanings in Subtraction

[*Remainder; difference*]

These stories about Queenie's pups show some ways of using subtraction. Write the subtraction fact for each problem. Use the dot picture to help you. Then answer the question below the problem.

1. 4 of the 7 pups were black, and the rest were tan. How many pups were tan?

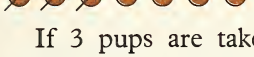
7 − 4 = 3

If 4 is one part of 7, *the other part* is ____.

2. If Bill wants to keep 2 pups, how many of the 7 pups can he give away?

If 2 out of 7 pups are left, *how many are gone?*

3. After Bill gave away 3 of the 7 pups, how many pups were left?



If 3 pups are taken from 7, *how many are left?*

4. The biggest pup weighed 8 ounces at birth, and the smallest weighed 3 ounces.

a. What was *the difference* between their weights?

b. The biggest pup was how many ounces heavier than the smallest one?

8 are *how many more* than 3? ____

c. The smallest pup weighed how many ounces less than the biggest one?

3 are *how many fewer* than 8? ____

In subtraction, we know the size of one of two groups or numbers and the sum of the two groups or numbers. We subtract to find how many are in the other group or number.

5. In Ex. 1–3, the other number is a remainder. It tells the other part in Ex. 1; the number gone in Ex. ____; the number left in Ex. ____.

6. In Ex. 4 the other number is the difference. In Ex. 4b, the difference tells how many _____; in Ex. 4c, it tells how many _____.

A Review of Subtraction

1. From the drawing above you can see that $4 + 5 =$ ____ and that $5 +$ ____ $=$ ____.

2. By covering dots you can prove that $9 - 4 =$ ____ and that $9 - 5 =$ ____.

3. The whole story in A. and S. about 4, 5, and 9 has these four related facts:

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Finish the whole stories in A. and S. that are started in Ex. 4–7.

4. $7 + 5 =$ ------- ----------

---------- ----------

5. $9 +$ ____ $= 13$ ----------

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6. $8 + 9 =$ ------- ----------

---------- ----------

7. $15 = 9 + 6$ ----------

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Addition facts help us to remember subtraction facts.

8. To help you with $13 - 8$, you may *think*, "$13 = 8 +$ ____"; then you also know that $13 - 8 =$ ____.

Give the A. fact that helps in Ex. 9–11.

9. $17 - 9 =$ ____ $17 = 9 +$ ____

10. $11 - 4 =$ ____ $11 = 4 +$ ____

11. $15 - 6 =$ ____ ----------

If you can write these facts quickly, you can subtract any numbers:

	a	b	c	d	e	f
12.	8 − 5	10 − 5	15 − 6	0 − 0	9 − 5	11 − 4
13.	15 − 7	8 − 2	5 − 1	9 − 9	16 − 9	3 − 0
14.	11 − 8	17 − 9	10 − 3	12 − 3	7 − 4	12 − 6
15.	16 − 7	11 − 7	4 − 0	8 − 3	12 − 9	10 − 4
16.	14 − 7	7 − 2	9 − 6	13 − 5	1 − 0	15 − 8
17.	14 − 5	8 − 1	9 − 3	13 − 8	7 − 7	15 − 9
18.	8 − 0	6 − 3	11 − 2	13 − 7	6 − 1	16 − 8
19.	6 − 2	9 − 1	10 − 6	2 − 0	11 − 3	14 − 9
20.	9 − 2	14 − 6	12 − 7	9 − 0	7 − 1	12 − 5
21.	17 − 8	13 − 6	1 − 1	18 − 9	8 − 4	7 − 3
22.	8 − 8	10 − 1	10 − 7	13 − 9	11 − 5	14 − 8
23.	12 − 4	11 − 6	7 − 0	9 − 4	12 − 8	6 − 6

Subtracting with Two-Place Numbers

[*Without and with borrowing*]

Each subtraction fact is part of a family, just as each addition fact is. If you know the subtraction fact, you can easily say remainders for other examples in that family.

A *Some members of the 7 − 4 family*

7	17	27	57	47	87
− 4	− 4	− 4	− 4	− 4	− 4
3	13				

1. Write the answers missing in box A.

2. Complete the rest of the 7 − 4 family:

37 − 4 = _____ 77 − 4 = _____

67 − 4 = _____ 97 − 4 = _____

B *Some members of the 13 − 9 family*

13	23	33	63	93
− 9	− 9	− 9	− 9	− 9

3. In box B, the ten's figure in each answer will be 1 _____ than the ten's figure in the minuend.

4. Write the answers in box B.

Complete each fact below and tell its family.

5. 47 − 6 = _____ (_____ family)

6. 30 − 8 = _____ (_____ family)

7. 29 − 5 = _____ (_____ family)

8. 64 − 9 = _____ (_____ family)

Write the remainders for Ex. 9–14.

9. 25 − 9 = _____ 12. 42 − 6 = _____

10. 60 − 4 = _____ 13. 54 − 3 = _____

11. 76 − 9 = _____ 14. 83 − 6 = _____

You can subtract 2-place numbers very quickly too. Study boxes C and D.

C

9	39	89 = 80 and 9
− 5	− 5	− 45 = 40 and 5
4	34	40 and 4, or 44

D

13	23	53 = 40 and 13
− 8	− 8	− 28 = 20 and 8
5	15	20 and 5, or 25

15. Subtract in box E. *Think*, "73 = 6 tens and _____ ones." Then *think*, "13 − 8 = _____, and 6 − 2 = _____." 73 − 28 = _____.

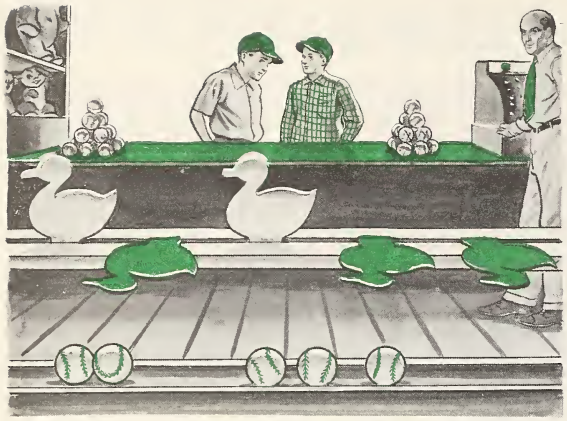
E

6 (13)
7 3
− 2 8

Subtract in rows 16–20. Try to work without showing the borrowing.

	a	b	c	d	e
16.	56	82	35	64	78
	− 24	− 30	− 31	− 19	− 48
17.	39	17	63	79	85
	− 32	− 16	− 48	− 76	− 69
18.	41	39	72	29	61
	− 26	− 23	− 16	− 24	− 47
19.	31	96	84	49	72
	− 10	− 48	− 57	− 41	− 55
20.	45	56	83	22	34
	− 34	− 27	− 77	− 12	− 18

Subtracting Large Numbers



1. Bill made 3 hits out of ___ shots. He missed ___ times. The S. fact is _____.

Write the remainders for Ex. 2–16.

	a	b	c	d	e	f
2.	5 − 3	7 − 4	9 − 7	8 − 5	6 − 4	7 − 5
3.	9 − 5	5 − 2	7 − 3	8 − 6	8 − 2	9 − 3
4.	7 − 2	9 − 6	8 − 3	9 − 2	8 − 7	9 − 4

5. 11 − 2 = _____
6. 13 − 6 = _____
7. 16 − 7 = _____
8. 17 − 9 = _____
9. 15 − 8 = _____
10. 12 − 9 = _____
11. 11 − 5 = _____
12. 15 − 7 = _____
13. 14 − 9 = _____
14. 12 − 4 = _____

	a	b	c	d	e
15.	11 − 6	13 − 7	16 − 8	13 − 9	12 − 3
16.	15 − 6	11 − 4	13 − 5	14 − 7	11 − 8

[*3- and 4-place minuends*]

$^{3}\,^{(13)}$ 6 4 3	$^{2}\,^{(15)}$ 3 5 4	$^{5}\,^{(17)}\,^{(11)}$ 2,6 8 1	$^{5}\,^{(16)}\,^{(12)}\,^{(11)}$ 6,7 3 1
− 2 8	− 1 6 4	− 1,5 8 3	− 3,7 8 5
6 1 5	1 9 0	1,0 9 8	2,9 4 6

The examples in the box will remind you about borrowing.

Write the remainders for rows 17–25 below. Try to *think* the borrowing.

	a	b	c	d
17.	564 − 83	338 − 73	678 − 475	6,347 − 3,524
18.	834 − 366	674 − 579	925 − 832	7,762 − 2,364
19.	473 − 394	326 − 176	647 − 455	6,814 − 4,207
20.	929 − 698	419 − 367	381 − 195	1,629 − 982
21.	524 − 478	841 − 789	923 − 429	2,425 − 548
22.	788 − 289	984 − 546	951 − 338	8,519 − 3,775
23.	867 − 452	783 − 392	934 − 544	5,577 − 2,868
24.	431 − 285	567 − 342	246 − 157	9,614 − 8,754
25.	596 − 489	472 − 375	375 − 281	4,475 − 2,525

Zeros in Subtraction

2 9 (14) ~~3~~ ~~0~~ ~~4~~ − 6 5 2 3 9	4 9 (10) ~~5~~ ~~0~~ ~~0~~ − 3 5 4 1 4 6	3 9 (15) (10) ~~4~~,~~0~~ ~~0~~ ~~0~~ − 1,5 9 7 2,4 6 3	4 9 9 (13) ~~5~~,~~0~~ ~~0~~ ~~3~~ − 3 2 5 4,6 7 8

The examples in the box show how you borrow when there are zeros in the number you subtract from. Here is some special practice that will help you.

	a	b
1.	10 − 1 = _____	9 − 3 = _____
2.	9 − 0 = _____	10 − 2 = _____
3.	20 − 1 = _____	9 − 7 = _____
4.	9 − 5 = _____	10 − 8 = _____
5.	10 − 4 = _____	200 − 1 = _____
6.	9 − 2 = _____	9 − 4 = _____
7.	30 − 1 = _____	10 − 7 = _____

[*3- and 4-place minuends*]

Write the remainders. For help, study the borrowing in the box.

	a	b	c	d
8.	6 0 7 − 3 2	3 0 0 − 2 7 5	5,0 4 0 − 7 0 6	2,0 0 2 − 6 5 3
9.	8 0 0 − 8 9	9 0 5 − 6 4 0	7,0 0 7 − 4 3 8	4,0 0 0 − 9 5 0
10.	3 5 0 − 9 8	2 0 0 − 1 0 9	1,0 5 0 − 8 2 4	3,0 0 3 − 3 0 3
11.	5 0 0 − 4 0 9	7 0 2 − 3 0 0	6,0 0 4 − 2,3 0 6	8,4 3 0 − 7 4 2
12.	1 0 4 − 6 8	7 0 0 − 1 8 8	5,0 2 5 − 7 7 5	3,2 0 6 − 3,0 5 7

Number Tricks and Puzzles

1. Ed's grandfather showed him this puzzle. Grandfather said, "Write three numbers of 2 figures each. Then I'll write three numbers, and I'll tell you the sum of all six numbers without adding."

Ed tried to make it hard for Grandfather. He wrote 79, 87, and 98.

Quick as a flash, Grandfather wrote 20, 12, and 1, and said, "The sum is 297."

Add in the box. Was Ed's grandfather right?

A
79
87
98
20
12
1

2. Now let's see how Grandfather chose his numbers. Look in the next column.

Find the sum of each pair of numbers.

Pairs:	*1st*	*2d*	*3d*
Ed's numbers:	7 9	8 7	9 8
Grandfather's:	2 0	1 2	1

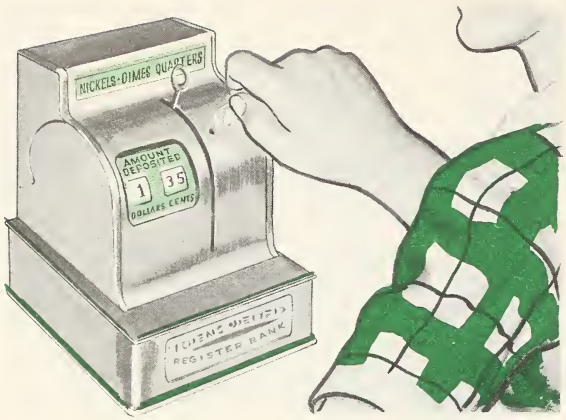
3. Grandfather had just subtracted each of Ed's numbers from ___.

4. Now work in boxes B and C as Grandfather would.

If the first three numbers are 2-place, the answer is always 297.

B	C
2 4	_____
6 5	_____
3 2	_____
_____	_____
_____	_____
_____	_____
.	

Adding and Subtracting Money Numbers



Mary's bank registers nickels, dimes, and quarters, up to $10. Every time Mary puts in a coin and pulls the lever, a bell rings and the total amount in the bank shows.

1. In the picture, Mary's bank shows a total of $_____. $1.35 is read, "One _____ and 35 _____." $1.35 could also be written as _____¢.

2. If Mary puts in a nickel, the bank will register a new total of $_____. If Mary then puts in a dime, she will have $_____ in the bank.

3. The addition example for Ex. 2 is shown in box A. Find the total.

What must you write to show that the answer in box A is a money number?

_____

_____

A
$1.35
0.05
+0.10

4. Mary's bank will hold $10. How much more must Mary add to the total shown in the picture before the bank is full?

Subtract in box B.

B
$10.00
−1.35

Find the sums. Check each sum.

	a	b	c	d
5.	$1.45 +1.36	$5.08 +0.83	$0.97 +3.06	$0.45 +0.98
6.	$1.50 0.25 +0.10	$2.95 0.10 +0.05	$0.74 0.05 +0.10	$7.50 5.35 +1.75
7.	$5.95 2.31 +1.04	$2.10 0.75 +0.25	$0.62 1.18 +0.24	$3.50 2.06 +1.70
8.	$10.25 +1.63	$12.78 +3.69	$0.38 +14.97	$20.10 +0.97

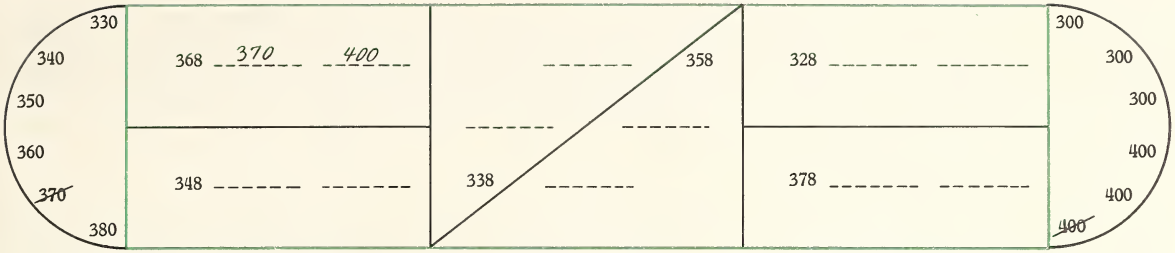
Find the remainders. Check.

9.	$5.47 −1.24	$1.50 −0.75	$2.08 −1.70	$6.00 −0.25
10.	$16.48 −2.35	$13.60 −5.46	$10.05 −9.02	$8.00 −2.74
11.	$4.06 −1.69	$0.84 −0.35	$3.10 −2.08	$9.75 −3.79
12.	$12.05 −0.08	$0.98 −0.79	$0.29 −0.04	$40.40 −4.04

Add or subtract as the sign tells you.

13.	$27.89 +24.65	14. $12.67 1.02 +0.08	15. $30.70 −13.80
16.	$10.05 0.70 +20.86	17. $30.52 −20.95	18. $17.07 −10.49

Let's See—How Are We Doing?



A New Kind of Hopscotch

1. The numbers in the curve at the left end are rounded to the nearest _____.
In the right end, the numbers are rounded to the nearest _____.

2. Round each of the numbers inside the colored lines in two ways. Use the rounded numbers in the curved ends.

Cross out each number in an end as you use it. 368 is rounded for you.

At the right of each example below, round the numbers and estimate the answer. Then work the example.

3. Example	Estimate	4. Example	Estimate	5. Example	Estimate
547	500	6,821	_____	7,340	_____
+288	_____	−4,189	_____	+5,908	_____

Find any mistakes in the examples below. If an answer is right, make a check mark (✓) on the dashed line. Cross out any wrong answer and write the correct one.

	a	b	c	d	e	f	g	h
6.	46	100	$3.06	1,000	$0.68	217	2,000	$30.17
	−39	−87	−0.85	−997	+0.32	−193	−897	+0.95
	15	13	$2.11	1,003	$0.90	24	1,213	$31.02
	_____	_____	_____	_____	_____	_____	_____	_____

Cross out wrong solutions in Ex. 7–9.

7. Mary put a stamp on each of 3 letters. Then she had 7 stamps left. How many stamps did she have at first?
(7 − 3 = 4) (7 + 3 = 10)

8. Bill had 150 feet of string on his kite. After he tied on a 50-foot piece of string, how long was his kite string?
(150 + 50 = 200) (150 − 50 = 100)

9. Ellen needed 6 tablespoons of cocoa for cookies. There were only 2 tablespoons of cocoa in the tin.

a. How much more cocoa did she need?
(6 + 2 = 8) (6 − 2 = 4)

b. She had how much less cocoa than she needed?
(6 − 2 = 4) (6 + 2 = 8)

Let's See—How Well Do You Remember?

1. If **n** − 4 = 13, then 4 and 13 are the two parts of **n**. You can find **n** by _____ _____ and _____. **n** = _____

2. If 9 + **n** = 12, then 9 and **n** are the two parts of 12. You can find **n** by _____ _____ from _____. **n** = _____

3. 9 + n = 16; n = _____

4. n + 6 = 12; n = _____

5. n − 9 = 9; n = _____

6. 7 + n = 14; n = _____

7. n − 2 = 10; n = _____

8. 7 + n = 17; n = _____

9. 12 = n − 5; n = _____

10. 4 + n = 13; n = _____

11. n + 15 = 17; n = _____

Add or subtract, as the sign tells you to do.

	a	b
12.	620 + 186	781 − 483
13.	467 + 534	2,056 − 1,877
14.	1,205 + 3,078	15,312 − 9,423
15.	3,064 + 2,078	32,100 − 7,905

Solve these problems in your head. Write just the answers.

16. The meeting began at 20 minutes of 2. Mother arrived at 25 minutes of 2. Was she early or late, and how many minutes?

_____

17. Ed left at 25 minutes past 3 and rode his bicycle to the post office in 12 minutes. At what time did he reach the post office?

_____

18. Ginny had 25¢ in her purse after she spent 45¢ for a present for her mother. How much money was in her purse in the beginning?

_____¢

19. Sam's hens laid 18 eggs on Monday and 23 eggs on Tuesday. They laid how many more eggs on Tuesday than on Monday?

_____

Number Tricks and Puzzles

There is no trick about this, but it may surprise you!

1. Subtract the numbers in the box at the right.

2. Now add the figures in the minuend. Do your work below.

987,654,321
−123,456,789

9 + 8 + 7 + ___ + ___ + ___ + ___ + ___ + ___ = _____

3. Now add the figures in the subtrahend.

1 + 2 + 3 + ___ + ___ + ___ + ___ + ___ + ___ = _____

4. Add the figures in the remainder.

8 + 6 + 4 + ___ + ___ + ___ + ___ + ___ + ___ = _____

5. What do you notice about the three sums?

_____

A Review of Multiplication

[*Multiplication facts; M. without and with carrying*]

Write the products quickly.

	a	b	c	d	e	f
1.	2 × 2	4 × 5	6 × 2	9 × 0	3 × 5	1 × 9
2.	3 × 8	0 × 1	9 × 5	4 × 8	3 × 3	5 × 1
3.	3 × 7	2 × 8	6 × 0	4 × 9	7 × 5	2 × 9
4.	2 × 7	5 × 8	0 × 0	4 × 7	6 × 8	0 × 8
5.	9 × 8	3 × 2	8 × 8	7 × 9	9 × 9	8 × 7
6.	4 × 6	6 × 6	2 × 1	9 × 7	2 × 0	5 × 6
7.	6 × 9	7 × 2	0 × 3	4 × 2	8 × 6	1 × 2
8.	0 × 4	7 × 1	1 × 3	8 × 5	3 × 4	6 × 5
9.	0 × 2	8 × 4	7 × 6	8 × 1	7 × 4	6 × 3
10.	7 × 0	4 × 4	2 × 5	8 × 9	1 × 6	9 × 3
11.	8 × 0	3 × 9	7 × 7	3 × 6	6 × 4	5 × 5
12.	0 × 5	6 × 1	5 × 2	6 × 7	9 × 2	5 × 7

Multiply.

	a	b	c	d
13.	62 × 4	723 × 3	822 × 4	4,243 × 2

Here is some practice to help you with carrying in multiplication. Multiply and add mentally. For Ex. 14a, *think*, "5 × 2 = 10; plus 1 is 11."

	a	b
14.	5 × 2 + 1 = 11	3 × 9 + 2 = _____
15.	6 × 4 + 4 = _____	7 × 6 + 5 = _____
16.	9 × 7 + 5 = _____	5 × 9 + 4 = _____
17.	8 × 5 + 3 = _____	4 × 7 + 3 = _____
18.	3 × 7 + 2 = _____	7 × 9 + 6 = _____
19.	8 × 6 + 7 = _____	9 × 4 + 8 = _____
20.	9 × 8 + 7 = _____	5 × 3 + 3 = _____
21.	6 × 9 + 5 = _____	7 × 7 + 6 = _____
22.	7 × 8 + 4 = _____	4 × 6 + 3 = _____

Multiply. Watch the carrying!

	a	b	c	d
23.	387 × 6	763 × 8	524 × 4	2,561 × 7
24.	427 × 3	518 × 5	825 × 9	3,246 × 6
25.	269 × 4	432 × 6	647 × 8	1,728 × 8
26.	198 × 7	745 × 4	987 × 3	4,517 × 6

Multiplying by a Two-Place Number

Multiply. Write the figures of the partial products in neat, straight columns. Check by doing the work again.

	a	b	c	d	e	f
1.	59 × 24	67 × 92	28 × 28	41 × 67	53 × 35	48 × 39
2.	97 × 36	89 × 75	76 × 48	53 × 86	34 × 49	98 × 16
3.	684 × 32	537 × 25	473 × 17	365 × 59	219 × 92	186 × 64

Number Tricks and Puzzles

1. On page 18, you found that 45 is an interesting number. Here you will find that 37 as a factor gives interesting results.

Do these multiplications:

a. $3 \times 37 =$ _____, and $1 + 1 + 1 =$ _____

b. $6 \times 37 =$ _____, and $2 + 2 + 2 =$ _____

c. $9 \times 37 =$ _____, and $3 + 3 + 3 =$ _____

d. $12 \times 37 =$ _____, and $4 + 4 + 4 =$ _____

e. $15 \times 37 =$ _____, and $5 + 5 + 5 =$ _____

2. Give these products without multiplying:

a. $18 \times 37 =$ _____ **b.** $21 \times 37 =$ _____

3. Here is another multiplication game.

a. $7 \times 15{,}873 =$ _____

b. $14 \times 15{,}873 =$ _____

c. $21 \times 15{,}873 =$ _____

4. From Ex. 3, write the product for this example without multiplying:

$28 \times 15{,}873 =$ _____

5. By what number should you multiply 15,873 to get the product 888,888? Do this mentally!

_____ $\times 15{,}873 = 888{,}888$

Two-Place and Three-Place Multipliers

[*Multiplying by the smaller factor*]

Miss Otis asked the class to find the product of 314 × 82.

Bill used the factor 314 as the multiplier.

Ann knew that it is easier to multiply by the smaller number, so she reversed the factors. She also reversed the figures in 82, because she thought that 28 looked like an easier multiplier than 82.

Sally multiplied by the smaller factor, 82.

Bill

$$\begin{array}{r} 82 \\ \times 314 \\ \hline \end{array}$$

Ann

$$\begin{array}{r} 314 \\ \times 28 \\ \hline \end{array}$$

Sally

$$\begin{array}{r} 314 \\ \times 82 \\ \hline \end{array}$$

Do all three multiplications in the boxes.

Put a check (✓) beside the correct answers, and circle the example that is in the best form.

Explain what is wrong with Ann's way of working the example.

Find the products. Reverse the factors when it will shorten the work.

	a	b
1.	1,245 × 15	32 × 2,134
2.	5,786 × 25	3,569 × 19
3.	9,841 × 48	37 × 8,596
4.	4,319 × 65	6,785 × 46
5.	1,782 × 91	3,247 × 87
6.	1,435 × 685	4,563 × 372
7.	3,849 × 42	576 × 6,718
8.	4,359 × 149	8,197 × 219

Multiplying with Money Numbers

1. The baseball outfits worn by players on the Little League teams in Southville cost $10.95 each. How much did 18 outfits cost?

You multiply with money numbers just as with whole numbers. In the product, write the decimal point to show cents and write a dollar sign.

Multiply in the box.

$$\begin{array}{r} \$10.95 \\ \times 18 \\ \hline \end{array}$$

The 18 outfits cost $_____.

Find the products. Be sure to write the decimal point and the dollar sign in the product when you multiply a money number.

	a	b	c	d	e
2.	$\$10.87 \times 19$	$\$0.75 \times 40$	$\$25.06 \times 107$	$\$60.50 \times 39$	$\$48.34 \times 68$

An estimate of the product is important in multiplying money numbers. It may show a misplaced decimal point. In Ex. 3-9, first estimate; then multiply and write the exact answer.

3.	$24 \times \$16.95 = ?$	Estimate: $20 \times \$20$	$_____	Answer: $_____
4.	$205 \times \$9.45 = ?$	Estimate: ____ × ____	$_____	Answer: $_____
5.	$107 \times \$25.06 = ?$	Estimate: ____ × ____	$_____	Answer: $_____
6.	$31 \times \$83.98 = ?$	Estimate: ____ × ____	$_____	Answer: $_____
7.	$952 \times \$1.16 = ?$	Estimate: ____ × ____	$_____	Answer: $_____
8.	$8 \times \$67.87 = ?$	Estimate: ____ × ____	$_____	Answer: $_____
9.	$19 \times \$0.59 = ?$	Estimate: ____ × ____	$_____	Answer: $_____

10. An estimate is a good check of any product. Notice the zeros in the rounded numbers: $1{,}000 \times 1{,}000 = 1{,}000{,}000$.

A good estimate for the product of $4{,}625 \times 2{,}132$ would be:

_____ × _____ = _____

Practice in Estimating Products

Multiply in your head. Write just the answers.

	a	b	c
1.	$30 \times 600 =$ _____	$9 \times 4{,}000 =$ _____	$100 \times 1{,}000 =$ _____
2.	$6 \times 800 =$ _____	$700 \times 300 =$ _____	$4 \times 900 =$ _____
3.	$200 \times 800 =$ _____	$500 \times 500 =$ _____	$40 \times 8{,}000 =$ _____
4.	$90 \times 4{,}000 =$ _____	$600 \times 700 =$ _____	$50 \times 900 =$ _____

5. To estimate the product of 52×49, you can *think*, "$50 \times$ _____ $= 2{,}500$."

The exact product is _____. (Do the work in the box.) Is the estimate close? _____

Ex. 5

$$\begin{array}{r} 49 \\ \times\ 52 \\ \hline \end{array}$$

In Ex. 6–21, estimate mentally. Write the estimates before you find the exact products.

Use another sheet of paper for your multiplications.

6. $7 \times 69 =$ _____
   Estimate: $7 \times 70 =$ _____
7. $62 \times 51 =$ _____
   Estimate: $60 \times 50 =$ _____
8. $9 \times 28 =$ _____
   Estimate: _____ $\times$ _____ = _____
9. $38 \times 42 =$ _____
   Estimate: _____ $\times$ _____ = _____
10. $21 \times 27 =$ _____
    Estimate: _____ $\times$ _____ = _____
11. $8 \times 298 =$ _____
    Estimate: _____ $\times$ _____ = _____
12. $3 \times 587 =$ _____
    Estimate: _____ $\times$ _____ = _____
13. $60 \times 904 =$ _____
    Estimate: _____ $\times$ _____ = _____
14. $70 \times 508 =$ _____
    Estimate: _____ $\times$ _____ = _____
15. $58 \times 70 =$ _____
    Estimate: _____ $\times$ _____ = _____
16. $93 \times 1{,}009 =$ _____
    Estimate: _____ $\times$ _____ = _____
17. $51 \times 8{,}203 =$ _____
    Estimate: _____ $\times$ _____ = _____
18. $82 \times 5{,}600 =$ _____
    Estimate: _____ $\times$ _____ = _____
19. $63 \times 3{,}206 =$ _____
    Estimate: _____ $\times$ _____ = _____
20. $401 \times 6{,}045 =$ _____
    Estimate: _____ $\times$ _____ = _____
21. $42 \times 392 =$ _____
    Estimate: _____ $\times$ _____ = _____

Visiting the Bookmobile

[*A., S., M. problems*]

In Stacy's town, the Bookmobile comes once a week. This is a truck, full of books on shelves, which the public library from the city sends each day to a different town.

Write your answers to these problems on the lines provided. Do your work in the space at the right.

Space for Work

1. One morning the Bookmobile loaned 179 books. In the afternoon it loaned 317 books. That day the Bookmobile loaned how many more books in the afternoon than in the morning?

---

2. In the morning 69 people came, and in the afternoon 127 people. How many came through the day?

---

3. If 92 people each took 2 books, and 104 people each took 3 books, how many books were taken?

---

4. Of the 127 people who came in the afternoon, 54 were children. How many grown people came?

---

5. The Bookmobile left 28 books at the Hill School, 15 at the Dale School, and 32 at the South School. How many books were left at all three schools?

---

6. After school, Bill went to the Bookmobile. He arrived at 8 minutes past 3 and stayed for 6 minutes. Then he spent 5 minutes in doing an errand at the store. After that he walked home, arriving at 27 minutes past 3. How long did it take Bill to walk home?

---

7. Stacy returned two books that were 2 weeks late. The fine was 2¢ a day for each book. Stacy had 58¢ in her purse. Was that enough to pay the fine?

This Is a Review!

1. In the box you will find an illustration for each of the terms listed below. Copy in the blank a number to illustrate each term.

a. minuend --------
b. factor --------
c. addend --------
d. product --------
e. subtrahend --------
f. multiplicand --------
g. remainder --------
h. multiplier --------
i. sum --------

$$\begin{array}{r} 4 \\ +\,3 \\ \hline 7 \end{array} \qquad \begin{array}{r} 8 \\ -\,2 \\ \hline 6 \end{array} \qquad \begin{array}{r} 5 \\ \times\,9 \\ \hline 45 \end{array}$$

Here are some examples that Miss Otis used in a test and some of the answers that were given. If an answer is right, make a check (✓) beside it. If it is wrong, cross it out (**X**), and write the correct answer.

2. Round 4,395 to the nearest hundred.

Anne's answer: 44

3. What is the difference between 200 and 20?

Joe's answer: 0

4. Give a reasonable estimate for the product of 23 and 41.

Sam's answer: 80

5. What is the product of 6 and 9?

Sally's answer: 54

6. There are 60 seconds in a minute, and 60 minutes in an hour. How many seconds are there in an hour?

Bob's answer: 3,600

Draw a circle around A. or S. or M. to show whether you must add, subtract, or multiply. Then solve each problem and write the answer. Sometimes you have more than one step in a problem and must circle more than one letter.

Work on separate paper if you cannot do the figuring mentally.

7. Ann spent 20¢ and had 30¢ left. How much money did she have at first?

A. S. M. Answer: ----------

8. Bill earns $1.50 each Saturday afternoon. How much does he earn in 4 weeks?

A. S. M. Answer: ----------

9. Rita had 6 cookies. If she gave one to each of her three sisters and two to her mother, how many were left?

A. S. M. Answer: ----------

10. The one-way fare to Kent is 33¢, and the round-trip ticket costs 52¢. How much money can be saved on a round trip by buying a round-trip ticket?

A. S. M. Answer: ----------

11. Ava's mother put 3-cent stamps on her Christmas cards. If she sent 86 cards, how much did the stamps cost?

A. S. M. Answer: ----------

12. The charge for Mr. Rich's telephone call was 75¢ for the first 3 minutes and 10¢ a minute after that. If he talked for 5 minutes, how much did Mr. Rich pay?

A. S. M. Answer: ----------

13. Uncle Jack lives 19 miles from his work. How long is the round trip to and from work?

A. S. M. Answer: ----------

Testing What You Have Learned

1. The number 6,475 has _____ places and _____ periods.

a. 6,475 means 6 _____ and 4 _____ and 75 _____.

b. 6,475 also means 64 _____ and _____ tens and _____ ones.

c. 6,475 also means 647 _____ and _____ ones.

Round in Ex. 2–5 as directed.

2. 686 to the nearest ten _____

3. 3,279 to the nearest ten _____; to the nearest hundred _____

4. 9,842 to the nearest thousand _____

5. 653,298,500 to the nearest million

Write in figures:

6. four tens and five _____

7. six hundreds and six _____

8. thirty-three tens _____

9. one hundred thousand, one hundred ten

Write with Arabic numerals:

10. XXIV _____ 12. LXIX _____

11. XL _____ 13. MCML _____

14. Write the whole story in A. and S. for 6, 7, and 13.

_____ _____

_____ _____

15. To find **n** in the example $14 + n = 26$, you *think*, "26 ___ 14 = _____."

16. Write two examples in the $5 + 3$ addition family. _____; _____

17. In the example 3×8, the ___ means ___ groups, each containing ____ things.

18. If you have to find the product of $2{,}146 \times 35$, which number will you use as the multiplier?

_____

19. Write two examples in the $17 - 9$ subtraction family.

_____ _____

20. A good estimate for the product of 8×629 is $8 \times$ _____, or _____.

Find the answers.

	a	b	c	d
21.	15 +34	27 +362	$3.26 +1.85	5,329 +2,972
22.	46 −24	874 −52	$3.95 −0.66	8,234 −458
23.	206 −39	800 −356	5,005 −678	$20.70 −13.85
24.	32 ×4	86 ×7	$3.08 ×6	3,926 ×8

25. Write products for Ex. a–c.

a. $48 \times \$0.75 =$ _____

b. $205 \times \$4.98 =$ _____

c. $4{,}507 \times 3{,}060 =$ _____

The Flower Shop

Sometimes Iva and Joe help in their father's flower shop. One day their father told them to use roses to show the two kinds of division (measurement division and fractional-part division) which they were studying in school.

He gave Iva 12 roses and some vases, and told her to put 3 roses in each vase.

The picture below shows that Iva first counted 3 roses and put them in a vase.

1. Draw another vase beside Iva's and put 3 roses in it. Keep on drawing vases with 3 roses in each until all 12 roses have been used.

2. How many vases did Iva need for her roses? _____

$12 \div 3 =$ _____

3. If 12 things are divided into groups with 3 in a group, there are ____ groups.

4. Iva measured 12 by ____, to see how many 3's there are in 12. There are _____ 3's in 12.

Measurement division tells how many equal groups are contained in a larger group.

Joe had 12 roses, too. He was to divide them equally among 3 vases.

First Joe put 1 rose in each of the 3 vases, as shown in the picture above.

5. Then Joe put another rose in each vase. Draw roses in the vases to show this.

6. To show how Joe divided the rest of the flowers, keep on drawing roses in the vases until you have used all 12 roses.

7. How many roses did Joe put in each of the 3 vases? _____

$\frac{1}{3}$ of 12 = _____

8. If 12 things are divided into 3 equal parts, there are _____ in each part.

9. Joe divided 12 into ____ equal parts, called _____. One third of 12 is _____.

Fractional-part division tells how many there are in each of the equal parts of a group.

10. The division fact $12 \div 3 = 4$ may tell that

a. there are _____ 3's in 12; or that

b. there are ____ in each of the ____ equal parts of 12.

Division Facts and Related Multiplication Facts

1. Complete the following:

a. $2 \times 3 =$ ____ b. $3 \times 2 =$ ____

← *Quotient* →

c. $3\overline{)6}$ d. $2\overline{)6}$

2. Ex. 1 tells in different ways that there are two 3's in ____ and three 2's in ____.

3. If $6 = n \times 3$, then $n =$ ____. To find **n** here, you _____ 6 by ____.

We divide to find the missing factor.

Multiplication facts go with related division facts to make whole stories.

4. The whole story in M. and D. about 2, 3, and 6 is:

$2 \times$ _____ $= 6$ $6 \div 3 =$ _____

$3 \times$ _____ $= 6$ $6 \div 2 =$ _____

5. Write the whole story in M. and D. about

a. 5, 9, and 45. b. 8, 9, and 72.

_____ _____

_____ _____

_____ _____

_____ _____

c. 3, 9, and 27. d. 9, 7, and 63.

_____ _____

_____ _____

_____ _____

_____ _____

6. Write each of the following division facts in two other ways:

a. 9's in $18 = 2$ _____

b. $30 \div 6 = 5$ _____

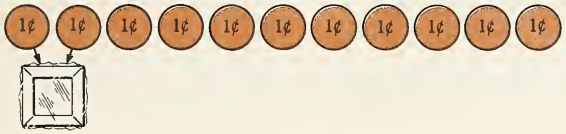
If you know all the division facts, you can divide any number. Write quotients to finish the following D. facts, using related M. facts when they help you.

	a	b	c	d	e
7.	$5\overline{)10}$	$8\overline{)64}$	$6\overline{)48}$	$9\overline{)54}$	$4\overline{)28}$
8.	$8\overline{)8}$	$6\overline{)42}$	$1\overline{)0}$	$7\overline{)35}$	$7\overline{)63}$
9.	$1\overline{)6}$	$4\overline{)12}$	$2\overline{)14}$	$3\overline{)0}$	$5\overline{)20}$
10.	$6\overline{)54}$	$7\overline{)0}$	$8\overline{)16}$	$4\overline{)20}$	$9\overline{)45}$
11.	$7\overline{)7}$	$2\overline{)18}$	$5\overline{)15}$	$1\overline{)1}$	$3\overline{)12}$
12.	$8\overline{)48}$	$6\overline{)36}$	$3\overline{)21}$	$6\overline{)6}$	$5\overline{)25}$
13.	$4\overline{)16}$	$4\overline{)36}$	$8\overline{)24}$	$5\overline{)40}$	$4\overline{)8}$
14.	$4\overline{)0}$	$3\overline{)24}$	$5\overline{)35}$	$9\overline{)18}$	$8\overline{)72}$
15.	$7\overline{)42}$	$9\overline{)9}$	$3\overline{)15}$	$1\overline{)8}$	$5\overline{)0}$
16.	$6\overline{)18}$	$4\overline{)24}$	$7\overline{)56}$	$7\overline{)21}$	$6\overline{)24}$
17.	$1\overline{)2}$	$9\overline{)63}$	$4\overline{)32}$	$6\overline{)0}$	$8\overline{)56}$
18.	$5\overline{)5}$	$9\overline{)81}$	$8\overline{)40}$	$9\overline{)27}$	$7\overline{)28}$
19.	$3\overline{)18}$	$5\overline{)45}$	$7\overline{)49}$	$3\overline{)27}$	$8\overline{)0}$
20.	$4\overline{)4}$	$7\overline{)14}$	$3\overline{)9}$	$6\overline{)30}$	$9\overline{)72}$
21.	$2\overline{)16}$	$9\overline{)0}$	$5\overline{)30}$	$8\overline{)32}$	$1\overline{)3}$
22.	$3\overline{)3}$	$2\overline{)8}$	$1\overline{)9}$	$2\overline{)0}$	$9\overline{)36}$
23.	$2\overline{)6}$	$6\overline{)12}$	$3\overline{)6}$	$2\overline{)2}$	$1\overline{)4}$

Table Numbers in Uneven Division

1. Ralph has 11¢. How many 2¢ candies can he buy? Will he have any money left, and, if so, how much?

To find out, finish the diagram below.



Ralph can buy _____ candies, and he will have ____¢ left.

2. On another paper, subtract to find how many times you can take 2 out of 11.

There are _____ 2's in 11, and there is a remainder of ____.

A $\begin{array}{r} 5, \text{R}1 \\ 2\overline{)11} \\ \underline{10} \\ 1 \end{array}$	**B** $\begin{array}{r} 5, \text{R}1 \\ 2\overline{)11} \end{array}$
	C $11 \div 2 = 5, \text{R}1$

3. In dividing 11 by 2 (boxes A–C), you have to know how many 2's you can take from 11 all at one time. $11 \div 2$ is not in any division table, but $10 \div 2$ is. 10 is the table number to use because it is next smaller than 11.

$10 \div 2 = 5$, so $11 \div 2 =$ ____, R____.

4. Complete the table with divisor 2:

$2\overline{)2}$ $2\overline{)4}$ $2\overline{)6}$ $2\overline{)8}$ $2\overline{)10}$

$2\overline{)12}$ $2\overline{)14}$ $2\overline{)16}$ $2\overline{)18}$

5. The table numbers for dividing by 2 are 2, 4, ---, ---, ---, ---, ---, ---, ---.

6. For $2\overline{)17}$ you would use _____ as the table number because it is next _____ than 17.

$17 \div 2 =$ ____, R____

In uneven division facts, you use table numbers to help you.

Under each example, write the table number you would use. Do not divide yet.

	a	b	c	d
7.	$6\overline{)25}$	$3\overline{)17}$	$4\overline{)18}$	$7\overline{)32}$
	------	------	------	------
8.	$9\overline{)52}$	$5\overline{)28}$	$8\overline{)63}$	$2\overline{)15}$
	------	------	------	------
9.	$3\overline{)29}$	$7\overline{)46}$	$4\overline{)31}$	$6\overline{)38}$
	------	------	------	------
10.	$5\overline{)49}$	$9\overline{)70}$	$2\overline{)19}$	$8\overline{)47}$
	------	------	------	------

11. $83 \div 9 =$ _____ **12.** $74 \div 8 =$ _____

------ ------

13. $25 \div 7 =$ _____ **14.** $58 \div 6 =$ _____

------ ------

15. Now divide in Ex. 7–14. Try to think the multiplication and subtraction and write only quotient and remainder, as in boxes B and C. Copy the example on separate paper if you have to write the work.

16. $26 \div 4 =$ ____, R____. To check the answer, you multiply ____ $\times 4$ and add ____. The result should be _____.

17. $65 \div 9 =$ ____, R____.

Check: ___ $\times 9 =$ ____; ____ $+$ ___ $=$ ____.

Division with Two-Place Quotient

[*Check*]

A	B	C	D	
34 quotient	26	37, R1	49, R4	**Check**
2)68 dividend	2)52	2)75	7)347	49
6 (3 tens × 2)	4	6	28	× 7
8	12	15	67	343
8 (4 × 2)	12	14	63	+ 4
divisor		1 remainder	4	347

1. As shown in box D, to check a division example, you multiply the _____ and the _____ and add the _____, if any. The result should equal the _____.

2. When you divide by 2, the largest remainder you can have is ____.

3. For the divisor 4, a remainder can be ____, ____, ____, or ____. When the remainder is ____, we do not write it.

Divide. Study boxes A–D if you need help.

	a	b	c	d	e	f
4.	4)196	6)256	3)170	8)604	7)552	5)323
5.	9)719	3)149	7)299	4)351	8)709	6)387

In Ex. 6–8, the answers are wrong. Copy each example in the space provided and write the work correctly.

6. 2, R6
   2)46
   40
   6

7. 34, R5
   6)239
   21
   29
   24
   5

8. 36
   5)181
   15
   31
   30

Number Tricks and Puzzles

1. Write any number — for example, 5,246. Then, using the same figures, write another number under the first one, as shown at the left below. Find the difference between the two numbers, and show that the difference between them can be divided by 9 without a remainder.

5,246
−2,654

9)_____

2. Now you choose a number and work the puzzle in Ex. 1. Be sure to subtract the smaller number!

_____ ____)_____

−_____

_____

3. Take 11 marbles. Take away 5, add 3, and the result is 8. Explain.

_____

Division with Larger Quotients

Divide. Write all your work.

	a	b	c	d
1.	2)1,096	8)10,627	6)1,199	7)4,250
2.	6)7,258	2)10,356	5)60,175	3)42,061

Finding the Average

See if you can work with averages.

1. Mother said, "I'll plan an average of 2 sandwiches apiece." If there were 6 people, how many sandwiches were needed?

_____

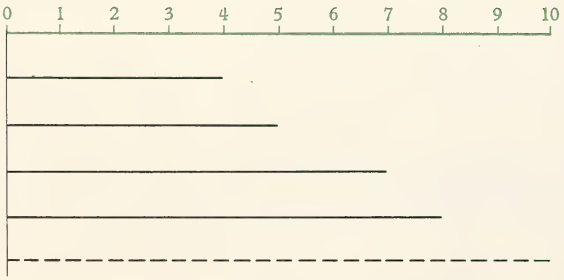
2. Bill said, "Maybe we ought to ask each one just how many he can eat!" This is the tally (record) Bill made of the number of sandwiches each one wanted.

Finish Bill's table and find the total. Then, to find the average, divide the total by the number of addends.

Mother . . .	/	1
Dad	//	2
Sally	//	_____
Pete	///	_____
Ruth	/	_____
Bill	///	_____
Total		_____
Average . . .		_____

Was Mother's plan a good one? _____

3. Blacken the dashed line below to show the average length of the four lines under the number scale.



4. The average of 4, 5, 7, and 8 can be found by dividing _____ by 4; the average is _____.

5. Four pupils reported their walking time between school and the post office. In minutes, their times were: Joe, 15; Marge, 18; Ted, 17; Bill, 14. What was the average time?

_____

Find the average of each of these sets of numbers. Work in the space below.

	a	b	c	d
6.	15	6	217	4,000
	19	7	243	3,000
	18	8		2,000
	16			

Number Tricks and Puzzles

This is a very old Egyptian puzzle:

A mule and a horse were carrying some bales of cloth.

The mule said to the horse, "If you give me one of your bales, I shall be carrying as many as you."

The horse replied, "But if you give me one of yours, I shall carry twice as many as you."

How many bales was each carrying?

Mule: _____ Horse: _____

Is there an average in this puzzle? _____

Why or why not? _____

_____

Division by a 2-Place Number

[*Trial quotient the true quotient*]

1. When Tim was sick in bed for a long time, his classmates bought him a bird-feeding tray for his window. The tray cost $3.95, and 42 pupils wanted to divide the cost equally.

Their teacher knew that $3.95 cannot be divided evenly by 42, so she agreed to pay the remainder. How much did each pupil pay, and how much did the teacher pay?

Divide (box A or box B). For 395 ÷ 42 *think*, "39 tens ÷ 4 tens = _____."

Multiply and compare. ___ × 42 = _____.

Subtract and compare. 395 − _____ = ____.

Each pupil paid ___¢; the teacher, _____¢.

A	B
9¢, R____¢ 42)395¢ 378 17	$0.09, R____¢ 42)$3.95 3 78 17

Divide. Write all your work on this page.

	a	b	c	d	e
2.	22)$ 1 . 9 9	30)2 4 0	43)3 1 6	75)$ 4 . 5 5	86)3 0 8
3.	52)$ 2 . 2 5	66)3 3 8	90)$ 7 . 2 9	64)$ 3 . 3 6	45)2 7 8
4.	32)2 5 8	54)3 8 4	21)$ 1 . 9 6	32)2 3 6	43)3 5 6
5.	84)3 7 8	72)5 5 0	56)$ 4 . 4 8	63)2 5 9	92)7 8 3

Finding the True Quotient

1. Work the example in box A. First *think*, "19 tens ÷ 5 tens." The table number is _____, and the quotient figure is _____.

A

$58\overline{)197}$

2. A division example gives you practice in multiplication, addition, and subtraction.

In the example in box A, you *divide* 19 by ____ to find the trial quotient; you *multiply* 58 by ____; in multiplying 3×58, you *add* ____ to ____; then you *subtract* _____ from _____.

Here is some practice that will help you in division examples. Try to do the work in your head, and write just the answers.

	a	b
3.	$5 \times 6 + 4 =$ _____	$3 \times 4 + 2 =$ _____
4.	$6 \times 8 + 3 =$ _____	$7 \times 5 + 3 =$ _____
5.	$2 \times 8 + 1 =$ _____	$4 \times 8 + 3 =$ _____
6.	$5 \times 9 + 3 =$ _____	$9 \times 6 + 6 =$ _____
7.	$4 \times 7 + 2 =$ _____	$5 \times 8 + 2 =$ _____
8.	$3 \times 9 + 1 =$ _____	$6 \times 6 + 4 =$ _____
9.	$7 \times 4 + 6 =$ _____	$9 \times 3 + 8 =$ _____
10.	$9 \times 5 + 7 =$ _____	$4 \times 6 + 1 =$ _____
11.	$8 \times 3 + 7 =$ _____	$8 \times 5 + 6 =$ _____
12.	$9 \times 4 + 5 =$ _____	$9 \times 2 + 3 =$ _____
13.	$7 \times 8 + 5 =$ _____	$7 \times 7 + 4 =$ _____
14.	$6 \times 7 + 5 =$ _____	$8 \times 6 + 2 =$ _____
15.	$9 \times 8 + 4 =$ _____	$6 \times 9 + 2 =$ _____
16.	$8 \times 7 + 4 =$ _____	$8 \times 2 + 5 =$ _____

[*Trial quotient not true quotient*]

	a	b	c	d
17.	346	812	705	453
	−328	−810	−680	−406
18.	211	318	262	150
	−195	−276	−252	−141

19. For box B, *think*, "28 tens ÷ 3 tens." From the division table for the divisor 3, you see that ____ is the table number, so you try ____ as the quotient. $9 \times 38 =$ _____. Is 9 the true quotient? _____

How can you tell? _____

_____

Try 8. $8 \times 38 =$ _____.

Is 8 right? _____

Try 7. $7 \times 38 =$ _____.

Work Ex. B. The true quotient is _____.

B

$38\overline{)284}$

Divide. Try to think the multiplication for each trial quotient.

		Trials for Quotient
20.	$26\overline{)160}$	$16 \div 2 =$ _____
		$8 \times 26 =$ _____
		$7 \times 26 =$ _____
		$6 \times 26 =$ _____
21.	$47\overline{)446}$	$44 \div 4 =$ _____
		Try 9.
		$9 \times 47 =$ _____

Dividing Larger Numbers

[*Some quotient figures non-apparent*]

A	B	C	D
8, R13 36)301 288 13	21 36)756 72 36 36	52, R15 45)2,355 225 105 90 15	38, R8 45)1,718 135 368 360 8

1. In box A, are there enough hundreds to give at least 1 to each of 36 groups? _____ Are there enough tens? _____ Then we have just 1 quotient figure, and it is written in _____ place.

2. In box B, are there enough hundreds to give at least 1 to each of 36 groups? _____ Are there enough tens? _____ Then we have ____ quotient figures. The first one is written in _____ place.

3. In box C, the first partial dividend is _____ tens, and the second partial dividend is _____ ones.

4. In box D, we first try ____ for the ten's quotient figure, then _____. For the one's figure we try ____, then _____.

Divide in rows 5–7. Write all your work on this page. Try to test the trial quotients in your head.

	a	b	c	d
5.	63)2,709	45)1,215	73)5,110	24)1,968
6.	14)389	33)1,749	65)2,360	66)1,195
7.	79)3,250	74)3,996	54)3,950	58)4,060

Do you remember Grandfather's puzzle? (It is on page 15.) Here is another one.

Grandfather said, "You write any number of 3 figures, and without dividing I will change it to a 4-figure number that is exactly divisible by 9."

Ed wasn't sure what "exactly divisible" means, so Grandfather explained that a number is exactly divisible by another number when there is no remainder.

1. Ed wrote 652. Quick as a flash, Grandfather changed it to 6,525 and said, "There, 6,525 is exactly divisible by 9. Prove it!"

In box A, write the quotient Ed found. Divide on another paper.

A

$9\overline{)6,525}$

2. Ed wanted to try again, so he wrote 123. Grandfather changed this to 1,233.

Divide 1,233 by 9. Write the quotient in box B.

B

$9\overline{)1,233}$

Is 1,233 exactly divisible by 9? _____

3. Grandfather explained Ex. 1 and 2 this way: "If the sum of the figures in a number can be divided by 9 without a remainder, the number is exactly divisible by 9."

To change 652 (Ex. 1), Grandfather thought, "6 + 5 + 2 = _____." Then from the M. table for 9's, he chose the product next larger than this sum, which is _____. So to make the sum of the 4 figures exactly divisible by 9, the fourth figure must be 18 − 13, or _____.

4. Why did Grandfather change 123 to 1,233?

_____

5. Change 975 to a 4-place number exactly divisible by 9.

_____

C

$9\overline{)\qquad\qquad}$

In box C, show that your answer is correct.

Division with 2-Place and 3-Place Quotients

[*Apparent and non-apparent quotient figures*]

Divide in Ex. **a–d** below. Write all your work on this page.

	a	**b**	**c**	**d**
1.	$34\overline{)894}$	$34\overline{)8,945}$	$47\overline{)3,307}$	$47\overline{)33,074}$

2. Notice that Ex. 1a and 1b are very much alike. In Ex. 1b the dividend has one more figure than the dividend in Ex. 1a. Is the same thing true of the quotients?

---

3. How many figures has the dividend in Ex. 1c? ____ in Ex. 1d? ____ How many figures has the quotient in Ex. 1c? ____ in Ex. 1d? ____

4. Miss Otis wrote $42\overline{)968}$ on the board and said, "How many figures will there be in the quotient? And tell why."

Bill said, "Three, because 968 has three figures."

Sally said, "Two, because the first division is 96 tens ÷ 42. The first quotient figure will be above 6 in ten's place, and the second above 8 in one's place."

Which was right? ---

Find the mistakes in Ex. 5–8. Then copy each example in the space at its right and work it correctly.

5.
```
   120, R51
74)9,381
   74
  198
  148
   51
```

6.
```
   291, R11
13)3,694
   26
  109
  107
   24
   13
   11
```

7.
```
   871, R30
35)30,415
   280
   241
   245
    65
    35
    30
```

8.
```
    80, R9
24)169
   160
     9
```

Divide in row 9. Do all your work on this page.

	a	b	c	d
9.	$32\overline{)6,944}$	$53\overline{)9,569}$	$86\overline{)8,937}$	$61\overline{)14,864}$

How Well Do You Remember?

Can you subtract and multiply correctly? If you can, you will not have much trouble in working division examples.

Subtract.

	a	b	c	d
1.	811 − 759	300 − 202	7,386 − 6,427	5,050 − 4,863
2.	705 − 627	140 − 82	1,005 − 868	1,000 − 997
3.	414 − 236	749 − 708	1,972 − 1,928	3,306 − 3,108

Multiply.

4.	354 × 4	826 × 7	473 × 6	5,142 × 8
5.	829 × 5	374 × 9	768 × 3	3,475 × 6
6.	718 × 9	287 × 7	496 × 3	2,953 × 6
7.	792 × 54	184 × 39	516 × 81	962 × 73
8.	5,006 × 58	708 × 69	3,060 × 37	2,590 × 16

	a	b	c
9.	6,015 × 324	3,456 × 109	2,304 × 580
10.	8,700 × 348	5,170 × 507	8,920 × 570

11. As a check to see if an answer is reasonable, you may estimate the result by using _____ numbers.

For each of Ex. 12–16, first estimate the product. Then write the exact product.

12. 4,625 × 2,132 = _____

Estimated product: _____

13. 7,800 × $41.50 = _____

Estimated product: _____

14. 1,024 × $31.45 = _____

Estimated product: _____

15. 1,932 × 8,239 = _____

Estimated product: _____

16. 86 × $0.69 = _____

Estimated product: _____

Dividing by 3-Place Divisors

[*Apparent and non-apparent quotient figures*]

Dividing by a 3-place divisor is no different from dividing by any number. Study the work in the box. Remember that we must write a figure in the quotient for each dividend figure we bring down.

Dividing hundreds	*Dividing tens*	*Dividing ones*
2	20	208, R41
423)88,025	423)88,025	423)88,025
84 6	84 6	84 6
3 42	3 425	3 425
		3 384
		41

In the problems below, you have to divide by a 3-place number. Use the space at the right to do your work.

Space for Work

1. Green coffee beans are shipped from Brazil in bags containing 133 pounds. About how many bags would 25,000 pounds of coffee beans make?

Why should you round the quotient to the next larger number of units? ---

---

2. A 9,000-acre tract of land was divided into 257 farms. To the nearest acre, how large was an average farm?

Why would you not round the quotient to the next larger number of units? ---

---

3. Mr. Osgood hoped to average 325 miles a day on a trip of 1,600 miles. About how many days would the trip take?

Divide in Ex. 4–7. Write all your work on this page.

4. $412\overline{)85,696}$

5. $224\overline{)27,300}$

6. $176\overline{)93,104}$

7. $720\overline{)25,920}$

Here is another good trick that uses all four operations—addition, subtraction, multiplication, and division.

1. Take any number: _____

   Multiply it by 6: _____

   Add 12: _____

   Divide by 3: _____

   Subtract 2: _____

   Divide by 2: _____

   Subtract the number: _____

   Add 9; the result is: _____

The result in Ex. 1 should be 10. In fact, the result is *always* 10, whatever number you begin with. Now try another.

2. Take any number: _____

   Multiply it by 6: _____

   Add 12: _____

   Divide by 3: _____

   Subtract 2: _____

   Divide by 2: _____

   Subtract the number: _____

   Add 9; the result is: _____

Using All Four Processes

[*Problems in A., S., M., D.*]

When an example tells you to add, you know what to do, but in problems you have to decide what process or processes to use.

In problems 1–7, first draw circles around the letters that tell the processes you will use. Then solve the problems mentally and write the answers. Read the problems carefully! Some have more than one step.

1. Hedda bought 15 three-cent stamps. How much did she pay for them?

A. S. M. D. Ans. _____

2. Amy spent 15¢ for 3¢ stamps. How many stamps did she get?

A. S. M. D. Ans. _____

3. Lucy paid 15¢ for a package of envelopes and 3¢ for a stamp. How much did she spend?

A. S. M. D. Ans. _____

4. Joan bought a 15¢ birthday card and a 3¢ stamp. The card cost how much more than the stamp?

A. S. M. D. Ans. _____

5. Sue wrote 3 notes in 15 minutes. What was the average time for a note?

A. S. M. D. Ans. _____

6. One day Mrs. Ames went by bus to visit a friend who lived on the other side of town. Each way, she paid 15¢ bus fare and 3¢ for a transfer. How much did the round trip cost?

A. S. M. D. Ans. _____

7. Mr. Ames talked for 8 minutes on a telephone call. The charge was 15¢ for the first 3 minutes, and 5¢ for each additional minute. Find the total cost of the call.

A. S. M. D. Ans. _____

Units of Measure

[*Tables; abbreviations*]

1. In the picture you will see many things that can be measured or that suggest the use of some unit of measure. Near each of these pictured items, write the name of the unit of measure that it suggests.

2. On the dashed lines in the columns below, write the correct abbreviation for each unit of measure. Choose from these:

bu.	gal.	lb.	oz.	qt.	T.
da.	hr.	mi.	pk.	rd.	yd.
ft.	in.	min.	pt.	sec.	yr.

feet _____	rods _____	gallon _____
pint _____	pecks _____	miles _____
day _____	ounce _____	minute _____
ton _____	inches _____	pounds _____
yard _____	quart _____	second _____
hour _____	bushel _____	foot _____

From the list of units of measure in Ex. 2, choose and write the one that fits best in each of Ex. 3–16.

3. Mrs. Day's family uses 14 _____ of milk a week.

4. Betty's weight was 75 _____.

5. The pencil was 5 _____ long.

6. Bill lives 2 _____ from school.

7. Sarah's letter weighed 2 _____.

8. The baseball game was 2 _____ long.

9. Mrs. Leeds bought 4 _____ of meat.

10. Each member of the spelling team was allowed 15 _____ for each word.

11. Tom's father ordered 3 _____ of coal.

12. The tank in Mr. Jones's automobile holds 15 _____ of gasoline.

13. Jack's pulse (heartbeat) was 78 beats per _____.

14. Sam's father is 72 _____ tall.

15. The telephone pole was 25 _____ high.

16. The roadside market sold apples at 3 _____ for 29¢.

17. Write three units of measure that may be used in each of the following kinds of measurement. Ex. 2 may help you.

Measures of Time	Measures of Weight	Linear Measure (Distance or Length)	Liquid Measure	Dry Measure
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Changing from One Unit of Measure to Another

1. There were 48 candy bars in a carton. Each bar weighed 1 oz. How many pounds of candy were there in the carton?

Draw a box around enough candy bars to make a pound. Keep on drawing boxes until you have used all the candy bars.

48 oz. = ____ lb.

2. To change 48 oz. to pounds, you must _____ 48 by ____. Since pounds
(*multiply; divide*)
are _____ than ounces, the number
(*larger; smaller*)
of pounds in 48 oz. is _____ than 48.
(*more; less*)

3. Mr. Storrs had 2 bu. of grain. He had how many pecks?

_____

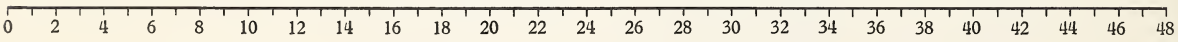
_____

On the lines, draw pictures of the pecks in each bushel.

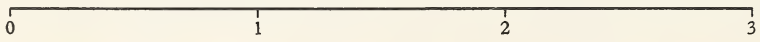
2 bu. = ____ pk.

4. To find how many pecks there are in 2 bu., you _____ 4 by ____.
(*multiply; divide*)
Since pecks are _____ than bushels,
(*larger; smaller*)
the number of pecks in 2 bu. is _____
(*more; less*)
than 2.

5. The number line below represents 48 inches. Mark it to show that 48 in. = _____ ft.



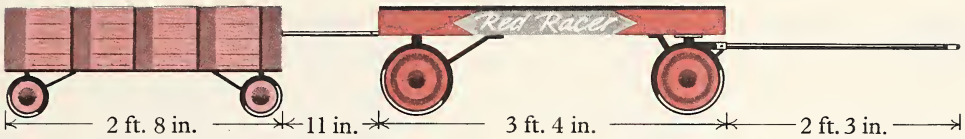
6. The number line below represents 3 yards. Mark it to show that 3 yd. = _____ ft.



Here is some practice in changing from one unit of measure to another.

	To change	Remember that	Multiply or divide?	Result
7.	3 feet to inches	1 ft. = _____ in.	*Multiply* 12 by _____	3 ft. = *36* in.
8.	14 days to weeks	1 wk. = _____ da.	_____ 14 by _____	14 da. = _____ wk.
9.	6 yards to feet	1 yd. = _____ ft.	_____ 3 by _____	6 yd. = _____ ft.
10.	4 pounds to ounces	1 lb. = _____ oz.	_____ 16 by _____	4 lb. = _____ oz.
11.	28 pecks to bushels	1 bu. = _____ pk.	_____ 28 by _____	28 pk. = _____ bu.
12.	180 seconds to minutes	1 min. = _____ sec.	_____ 180 by _____	180 sec. = _____ min.

Adding and Subtracting Measurement Numbers



1. In box A, find the total length from the back of the trailer to the end of the cart's handle.

The sum in the inches' column is _____ inches. So you change _____ inches to _____ feet _____ inches, and carry _____ feet to the column for feet. Finish the work.

2. In box B, find how much shorter the body of the trailer is than the body of the cart.

You cannot subtract 8 from 4, so you borrow ____ foot from ____ feet. This gives you _____ inches to add to ____ inches, and you subtract 8 from _____. Finish the work.

A

	2 feet	8 inches
		11 inches
	3 feet	4 inches
+	2 feet	3 inches

B

	3 feet	4 inches
−	2 feet	8 inches

3. In the examples on this page you must know these measures:

_____ inches (in.) = 1 foot (ft.)

_____ feet (ft.) = 1 yard (yd.)

_____ ounces (oz.) = 1 pound (lb.)

_____ months (mo.) = 1 year (yr.)

_____ seconds (sec.) = 1 minute (min.)

_____ minutes (min.) = 1 hour (hr.)

_____ quarts (qt.) = 1 gallon (gal.)

_____ pecks (pk.) = 1 bushel (bu.)

Add. Be careful about the carrying.

4. 6 ft. 9 in. + 4 ft. 6 in.

5. 10 lb. 3 oz. + 9 lb. 14 oz.

6. 2 yd. 2 ft. + 3 yd. 1 ft.

7. 5 hr. 35 min. 15 sec. + 2 hr. 10 min. 50 sec.

8. 11 yr. 7 mo. + 10 yr. 8 mo.

9. 7 bu. 3 pk. + 5 bu. 2 pk.

10. 2 gal. 2 qt. + 3 gal. 1 qt.

11. 1 yd. 2 ft. 9 in. + 2 yd. 1 ft. 8 in.

Subtract. Remember that in borrowing you change one larger unit to smaller units.

12. 8 min. 10 sec. − 5 min. 40 sec.

13. 9 ft. − 4 ft. 8 in.

14. 16 lb. 4 oz. − 10 lb. 12 oz.

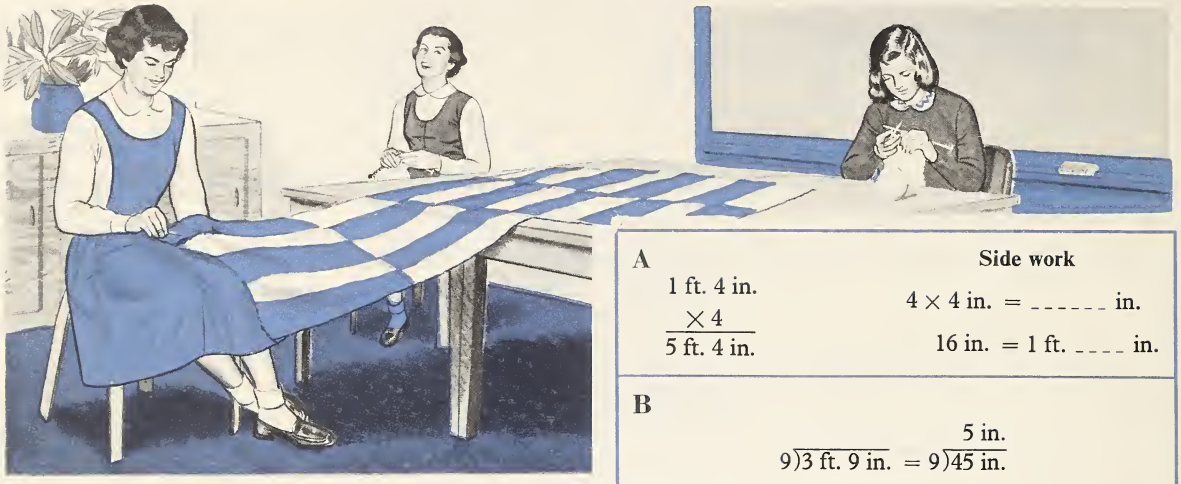
15. 4 yd. 2 ft. 6 in. − 3 yd. 2 ft. 10 in.

16. 7 yd. 1 ft. − 4 yd. 2 ft.

17. 5 gal. 2 qt. − 3 gal. 3 qt.

18. 3 bu. 1 pk. − 1 bu. 3 pk.

19. 3 hr. 5 min. 5 sec. − 1 hr. 20 min. 30 sec.



The girls in the Home Crafts Club made a knitted afghan to show at the County Fair.

Here are some of the problems the girls had when they were making the afghan. For each of problems 1–4, write the letter of the box that shows the work and copy the answer.

1. Mary knitted 4 short strips, each 1 ft. 4 in. long. What was the total length of her knitting?

Box: ____ Answer: _____

2. If each strip is 5 in. wide, how many strips, sewn together, would make 3 ft. 9 in.?

Box: ____ Answer: _____

3. To make a strip running the full length of the afghan, 5 ft. 4 in., the girls sewed 4 equal short strips together. Find the length of each of the short strips.

Box: ____ Answer: _____

4. What is $\frac{1}{9}$ of 3 ft. 9 in.?

Box: ____ Answer: _____

5. Finish the side work in box A. The answer in box A is ____ ft. 4 in. and not 4 ft. 4 in.

Why? _____

_____

A

1 ft. 4 in.
× 4
5 ft. 4 in.

Side work

4 × 4 in. = _____ in.

16 in. = 1 ft. ____ in.

B

$9\overline{)3 \text{ ft. } 9 \text{ in.}} = 9\overline{)45 \text{ in.}}$

5 in.
45 in.

C

$4\overline{)5 \text{ ft. } 4 \text{ in.}}$ = 1 ft. 4 in.

4 ft.
16 in.
16 in.

D

3 ft. 9 in. ÷ 5 in. = 45 in. ÷ 5 in.

$5\overline{)45}$ = 9

45

6. Show below how we get 45 in. in box B.

_____

7. In box B, if the divisor were 3, would you still have to change 3 ft. 9 in. to inches before dividing?

_____

8. In box D, if the divisor were 3 in., would you still have to change 3 ft. 9 in. to inches before dividing? Explain.

_____

_____

9. In box D, does the quotient, 9, mean "feet" or "inches" or "strips"? _____

Why? _____

_____

Multiplying and Dividing Measurement Numbers

Write only your answers here. Try to do Ex. 1–6 in your head.

	a	b	c	d
1.	1 yd. 2 ft. × 3	2 ft. 5 in. × 5	3 hr. 15 min. × 4	2 qt. 1 pt. × 8
2.	3 pk. 4 qt. × 3	4 lb. 7 oz. × 5	8 gal. 2 qt. × 2	1 ft. 6 in. × 6
3.	10 min. 20 sec. × 2	6 bu. 2 pk. × 7	2 hr. 45 min. × 2	2 yd. 2 ft. × 5
4.	5 min. 3 sec. × 4	5 lb. 3 oz. × 4	5 gal. 3 qt. × 4	5 pk. 3 qt. × 4
5.	3)12 gal. 3 qt.	5)3 ft. 4 in.	3)1 hr.	4)6 lb. 4 oz.
6.	4)2 yd. 2 ft.	6)7 bu. 2 pk.	4)10 min. 20 sec.	3)4 wk. 2 da.

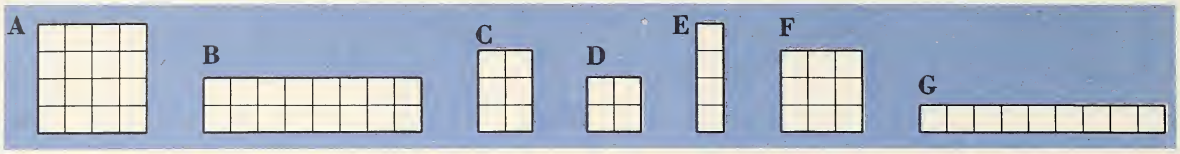
	a	b	c
7.	15 min.)1 hr. 15 min.	2 da.)3 wk. 1 da.	4 oz.)2 lb. 4 oz.
8.	1 pt.)2 qt. 1 pt.	2 ft.)2 yd.	3 qt.)5 gal. 1 qt.
9.	2 in.)3 ft. 4 in.	5 sec.)5 min. 5 sec.	2 ft.)3 yd. 1 ft.

10. To divide 2 yd. of ribbon into 6 equal parts, you must change 2 yd. to _____ ft. and find $\frac{1}{6}$ of that number.

$\frac{1}{6}$ of 2 yd. = _____ ft.

11. To find how many 15-minute radio programs you can hear in 1 hr. 45 min., you change 1 hr. 45 min. to _____ min., and divide _____ by 15. The answer is _____ programs.

[*Square inch; square foot*]



1. Which figures are squares? _____

2. List the other rectangles. _____

3. How many small squares in each figure?

A ____ B ____ C ____ D ____

E ____ F ____ G ____

4. Figures with the same area are ____ and ____; ____ and ____; ____ and ____.

5. A square and another rectangle have the same area if they contain the same number of _____ units of the same kind.

6. Two figures may have the same _____ even if they do not have the same shape.

Draw the following figures below. Label the width and length of each. Let each small square mean 1 square inch.

Below each figure, write its area (A) and its perimeter (p).

7. A square 5″ on a side.

8. A rectangle 4″ by 6″.

9. A rectangle 2″ wide that contains 8 square inches.

10. A square that contains 9 square inches.

11. A rectangle 4″ long with a perimeter of 14″. (HELPER. The two 4-inch sides will use 8 inches of the perimeter.)

7. 8. 9. 10. 11.

A = _____ sq. in. A = _____ sq. in. A = _____ sq. in. A = _____ sq. in. A = _____ sq. in.

p = _____ in. p = _____ in. p = _____ in. p = _____ in. p = _____ in.

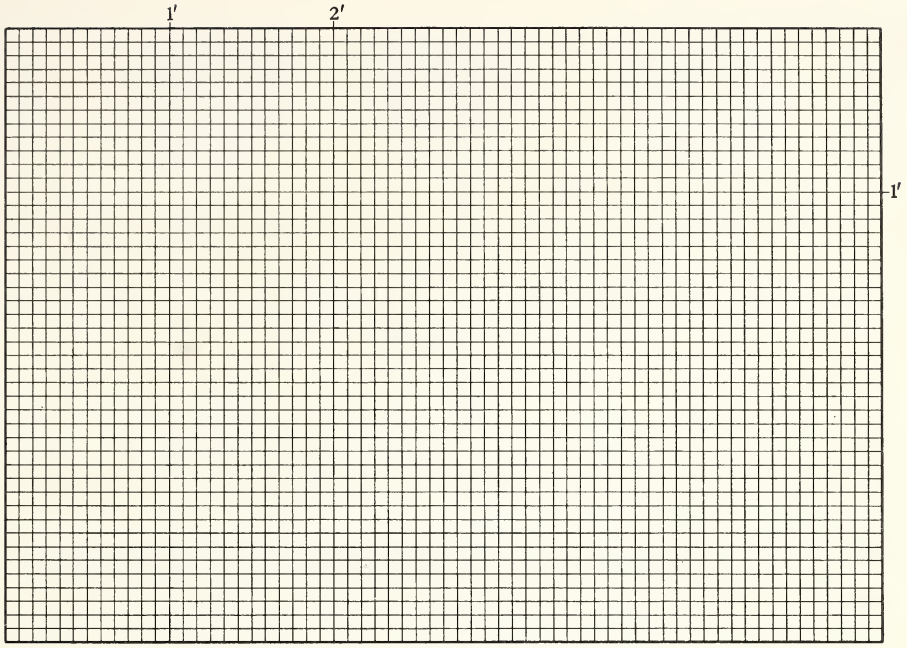
12. The afghan made by the Home Crafts Club (page 44) was 3 ft. 9 in. wide and 5 ft. 4 in. long.

a. It was _____ in. wide.

b. It was _____ in. long.

c. The area of the afghan was _____ sq. in.

d. Since _____ sq. in. = 1 sq. ft., the area of the afghan in square feet was _____ sq. ft.



The rectangle above represents the afghan made by the girls in the Home Crafts Club (see page 44). You are going to complete the diagram so as to show the pattern of the finished afghan.

Each small division of the squared paper stands for 1 inch, so each small square stands for 1 square inch.

1. The afghan was 5 ft. 4 in. long and 3 ft. 9 in. wide. Finish the marking that is started at the top and the right side of the afghan, to show the dimensions in feet.

2. To make the afghan, the girls knitted strips 5 inches wide. In the diagram, draw horizontal lines (lines running from left to right) to show these 5-inch strips. Use your ruler to help you keep the lines straight.

3. You should have _____ strips, each _____ squares wide.

4. At the left of the rectangle, label the strips. Beginning at the top, letter the first strip A, the next one B, and so on. The strip at the bottom should be lettered I.

5. Make small marks on the lower edge of the diagram to show how each strip was divided into blocks 1′ 4″ long.

6. Draw vertical lines (from top to bottom) to divide the whole rectangle into blocks 1′ 4″ long.

7. In strip A, beginning at the left, color the first and third blocks blue.

8. In strip B, color the second and fourth blocks blue.

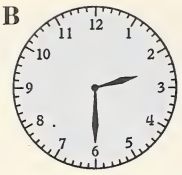
9. Continue to color the blocks so as to make a checkerboard pattern. Strips C, E, G, and I should be like A; and strips D, F, and H like B. When you have finished, your diagram will show all the parts of the afghan in their correct relationship to one another.

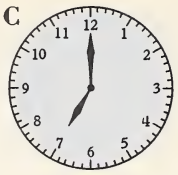
10. Each block is 5 in. wide and _____ in. long. What is the area in square inches of one block? _____ of all 36 blocks? _____ Does this agree with your answer to Ex. 12c, page 46? _____

Measuring Time by the Clock

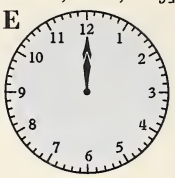
[*Second; minute; hour; day*]

A 

B 

C 

D 

E 

_____ _____ _____ _____ _____

1. Clocks and watches measure time in seconds, _____, and _____.

2. Complete this table of time:

_____ seconds (sec.) = 1 minute (min.)
_____ minutes (min.) = 1 hour (hr.)
_____ hours (hr.) = 1 day (da.)

3. In clock A, the minute hand points to 5; why does it mean 25 min. past the hour?

_____

_____

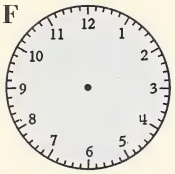
4. "Half past 3" means 30 min. past 3. Why? _____

5. What is another way of saying that the time is quarter past 2? _____

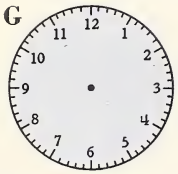
_____

6. You could read the time on clock A as _____ min. before (or "of") _____, but usually it is better to say the number of minutes before or after the nearer hour.

7. Below each of clocks A–E write the time the clock tells.

F 

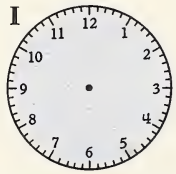
6:30

G 

20 min. of 5

H 

Quarter of 1

I 

10 min. past 10

J 

9 o'clock

8. Travel timetables use a short way of writing clock time. "Twenty minutes past 5" may be written 5:20, which is read "five twenty."

So 4:45 means _____ min. _____ 4 o'clock, which is the same as _____ minutes before _____ o'clock.

9. Most clocks measure 12 hours, so the hour hand must go completely around the clockface _____ times in 1 day.

10. A.M. means time from midnight to noon; P.M. means time from noon to midnight. Look up these abbreviations in your dictionary and write in your own words what the initials stand for.

_____

_____

_____

11. Draw hands on clocks F–J, above, to show the time given under each clock.

Measuring Time by the Calendar

[*Week, month, year, century*]

A Names of the Days

1.	Sunday

B Names of the Months

1.	January		

C Time by the Calendar

_____ days (da.) = 1 week (wk.)

_____ wk. = 1 year (yr.)

_____ months (mo.) = 1 yr.

1 mo. (except February) = ____ or ____ days

February has ____ da. in a common year, and

____ da. in a leap year

_____ yr. = 1 century

D

NOVEMBER 19_____

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.

1. Finish tables A, B, and C.

2. Look at a calendar to find on what day November begins this year. Then finish the calendar (box D) for November.

3. On your calendar, make circles around the dates for Veterans' Day (Nov. 11) and Thanksgiving Day (which is the fourth Thursday in November).

4. Use your November calendar (box D) to figure out the day of the week on which each of these dates will come:

a. Dec. 25, this year. _____

b. Jan. 1, next year. _____

5. Look at a calendar for December, this year. Did you answer Ex. 4 correctly?

_____

6. Sometimes we write dates in a short way. For example, March 14, 1956, may be written 3/14/56, or 3–14–56.

Write these dates in the long way:

a. 4/1/55 _____

b. 6–20–56 _____

c. 12/25/57 _____

d. 1–3–42 _____

7. Write the month, day, and year of your birth in the short way of Ex. 6.

_____

How Well Do You Remember?

[*Review*]

Work the following. In division, show remainders with R.

	a	b	c	d	e	f	g
1.	$3.24 1.08 +0.62	53 189 +796	3,097 45 +492	485 5,210 +86	756 207 +1,464	$50.75 8.09 +23.45	21,986 6,009 +783
2.	480 −175	875 −698	$10.98 −8.89	6,463 −908	$4.50 −2.75	7,100 −4,827	35,296 −26,549
3.	$9.08 −8.09	736 +684	5,347 +965	7,213 −472	$11.06 −3.28	$80.25 +29.87	76,124 −33,291

	a	b	c	d	e	f
4.	87 ×45	54 ×20	208 ×37	$3.52 ×24	6,248 ×53	4,302 ×634

	a	b	c	d
5.	25)$6.75	72)434	30)$250.50	24)$12,296
6.	300)2,100	236)31,094	518)236,406	482)98,372

Testing What You Have Learned

[Cumulative Review]

Add or subtract.

	a	b	c	d	e	f	g
1.	376 +295	\$2.95 +1.98	\$25.00 −9.75	\$9,500 −4,675	32,986 +15,215	54,209 −18,064	57,350 −29,487

Multiply.

	a	b	c	d	e
2.	273 ×15	\$8.69 ×32	2,195 ×54	18,962 ×26	\$302.79 ×12

Divide. Write any remainder, with R, beside the quotient.

3. $42\overline{)2,556}$ $57\overline{)1,254}$ $77\overline{)4,928}$ $65\overline{)5,885}$ $38\overline{)7,994}$

Add or subtract. Be careful when you carry and borrow.

4.	3 ft. 8 in. +2 ft. 9 in.	6 hr. 35 min. +7 hr. 45 min.	4 lb. 10 oz. +5 lb. 12 oz.	3 qt. 1 pt. +2 qt. 1 pt.	6 gal. 3 qt. +3 gal. 2 qt.
5.	8 min. 50 sec. −5 min. 38 sec.	2 bu. 2 pk. −1 bu. 3 pk.	10 yd. 1 ft. −7 yd. 2 ft.	8 ft. 9 in. −7 ft. 10 in.	4 wk. 3 da. −2 wk. 5 da.

Multiply. Try to carry mentally.

6.	2 ft. 7 in. ×4	4 hr. 20 min. ×5	2 yr. 8 mo. ×3	3 qt. 1 pt. ×6	8 lb. 13 oz. ×2

Divide. Write just your answers on this page.

7. $4\overline{)9 \text{ yd. } 1 \text{ ft.}}$ $12\overline{)9 \text{ hr.}}$ $8 \text{ in.}\overline{)6 \text{ ft.}}$ $3\overline{)7 \text{ lb. } 2 \text{ oz.}}$ $3 \text{ pt.}\overline{)15 \text{ gal.}}$

8. Round 875,296 **a.** to the nearest ten _____; **b.** to the nearest thousand _____

9. Write in Arabic numerals: **a.** MDCIV _____; **b.** XCII _____

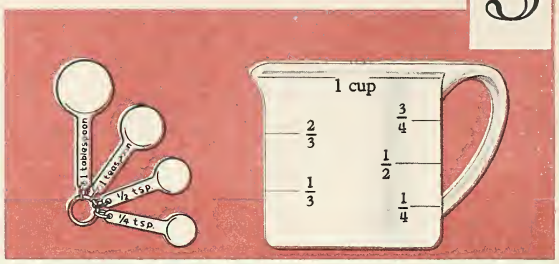
Reviewing Fractions in Cooking Measures

3

Good cooks use a lot of fractions! Let's see what you remember about fractions.

This is a table of standard cooking measures. All measurements are level.

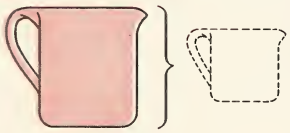
3 teaspoons (tsp.)	= 1 tablespoon (tbsp.)
16 tablespoons	= 1 cup (c.)
2 cups	= 1 pint (pt.)
2 pints	= 1 quart (qt.)



To measure accurately, most cooks use measuring cups and spoons like the ones pictured above.

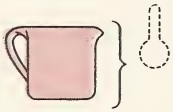
Draw pictures below to show how many of the smaller measures are needed to equal one of the larger. Fill in the dashed lines of the first small measure and draw as many more small measures as are needed. The table of measures above will help you.

1. 1 pint = ____ cups



(Ex. 1)

2. 1 cup = ____ tablespoons



(Ex. 2)

3. 1 tablespoon = ____ teaspoons

(Ex. 3)

4. Mark the teaspoons below to show:

a. $\frac{1}{4}$'s. Color or shade $\frac{2}{4}$ tsp.
b. $\frac{1}{2}$'s. Color or shade $\frac{1}{2}$ tsp.
c. $\frac{1}{8}$'s. Color or shade $\frac{4}{8}$ tsp.

a. b. c.

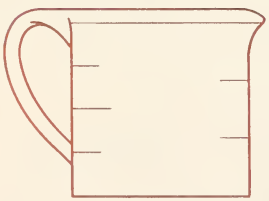
5. Since there are _____ tsp. in 1 tbsp.,

____ tsp. = $\frac{1}{3}$ tbsp.

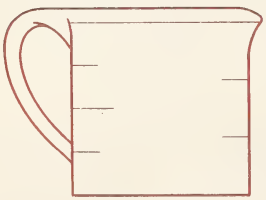
6. 1 cup = 16 tbsp., or _____ tsp.

7. $\frac{1}{4}$ cup = ____ tbsp.; $\frac{1}{2}$ cup = ____ tbsp.; $\frac{1}{8}$ cup = ____ tbsp.

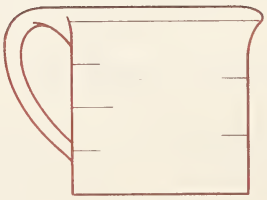
Most measuring cups are marked to show both thirds and fourths of a cup. Finish Ex. 8–11 below by expressing each amount as a fraction of a cup. Then finish the diagram for each exercise by coloring or shading the correct part of the cup.



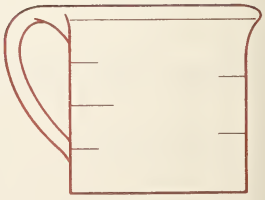
(Ex. 8)



(Ex. 9)



(Ex. 10)



(Ex. 11)

8. 4 tbsp. = ___ cup

9. 2 tbsp. = ___ cup

10. 8 tbsp. = ___ cup

11. 16 tsp. = ___ cup

Meaning of a Fraction

[*Terms; writing fractions*]

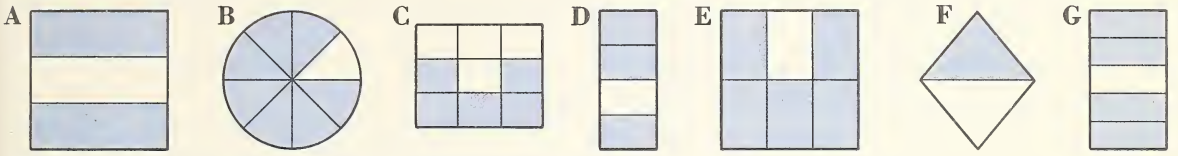
1. In this square, ____ of the ____ equal parts are colored. The fraction that tells what part of the square is colored is ____.

2. If a thing is divided into fourths, there must be ____ parts, and all the parts must be _____.

3. In the fraction $\frac{3}{4}$, the numerator is ____, and the denominator is ____.

4. A fraction is a number that means one or more _____ _____ of a whole.

5. Under each of the diagrams below, write the fraction that tells what part of the diagram is colored.

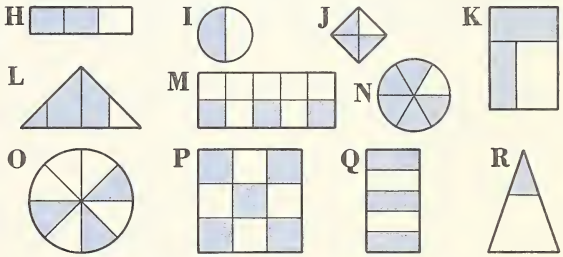


_____ _____ _____ _____ _____ _____ _____

6. Beside each of these fractions, write a letter to tell which diagram at the right shows that fraction as colored. Be careful! Some diagrams do not fit.

$\frac{3}{8}$ _____ $\frac{2}{3}$ _____ $\frac{3}{5}$ _____ $\frac{5}{6}$ _____

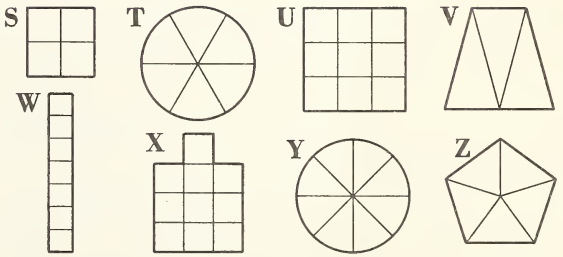
$\frac{5}{9}$ _____ $\frac{3}{4}$ _____ $\frac{3}{10}$ _____ $\frac{1}{2}$ _____



7. Color or shade one of the pictures at the right to show each fraction listed below. Then beside each fraction below write the letter of its diagram.

$\frac{3}{10}$ _____ $\frac{5}{8}$ _____ $\frac{2}{9}$ _____ $\frac{1}{4}$ _____

$\frac{1}{6}$ _____ $\frac{4}{7}$ _____ $\frac{4}{5}$ _____ $\frac{1}{3}$ _____



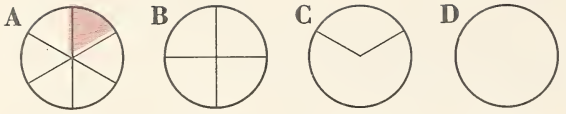
Write in figures:

8. Three eighths ____
9. Two thirds ____
10. One fourth ____
11. Four fifths ____
12. Nine tenths ____
13. One half ____
14. Five sixths ____
15. Two sevenths ____

Write in words:

16. $\frac{1}{12}$ _____
17. $\frac{3}{4}$ _____
18. $\frac{5}{8}$ _____
19. $\frac{7}{10}$ _____

Fractional Unit



1. Circle A is divided into ____ equal parts. The size of one of these parts is the size of the fractional unit for circle A. The fraction that names this fractional unit is _____.

2. The fractional unit for circle B is _____. Color or shade $\frac{1}{4}$ of circle B.

3. Draw one more line in circle C to finish dividing the circle into thirds. On each of the equal parts, write its name.

4. Divide circle D into halves. There are _____ equal parts. The fraction that names the fractional unit is _____.

5. In the fraction $\frac{1}{4}$, the numerator is _____; the denominator is _____.

6. Circles A, B, C, and D are equal in size. Circle _____ has the smallest fractional unit. Circle _____ has the largest fractional unit.

7. From Ex. 6, you see that the denominator gets _____ as the size of the fractional unit gets _____. Another way to say this is: The fewer equal parts into which you divide a whole, the _____ each part will be.
(larger; smaller)

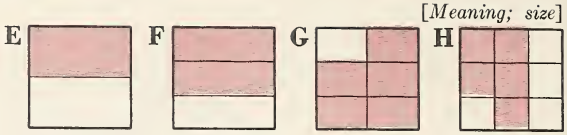
8. a. In circle A there are _____ $\frac{1}{6}$'s.

b. In circle B there are _____ $\frac{1}{4}$'s.

c. In circle C there are three _____.

d. In circle D there are _____ $\frac{1}{2}$'s.

[*Meaning; size*]



a. _____ _____ _____ _____

b. _____ _____ _____ _____

9. Look at squares E, F, G, and H, above. Under each square, write

a. the name of the fractional unit that measures the square;

b. the part of the square that is colored.

10. The _____ of a fraction shows the size of each equal part, that is, the size of the fractional unit; the _____ tells the number of equal parts in the fraction.

11. In the fraction $\frac{3}{8}$ each equal part is _____ of the whole, and there are _____ of the equal parts. The fractional unit for $\frac{3}{8}$ is _____.

12. Under each fraction below, write

a. the fractional unit;

b. the number of equal parts in the fraction.

$\frac{3}{4}$ $\frac{7}{8}$ $\frac{4}{5}$ $\frac{9}{10}$ $\frac{5}{9}$ $\frac{1}{6}$

a. _____ _____ _____ _____ _____ _____

b. _____ _____ _____ _____ _____ _____

13. The fractions below are all parts of the same whole. Circle the larger fraction in each pair.

a. $\frac{1}{2}$ $\frac{1}{100}$

b. $\frac{1}{7}$ $\frac{1}{9}$

c. $\frac{2}{7}$ $\frac{4}{7}$

d. $\frac{3}{4}$ $\frac{3}{8}$

e. $\frac{5}{16}$ $\frac{11}{16}$

f. $\frac{5}{16}$ $\frac{5}{11}$

Fractions on a Number Line

[*Proper and improper fractions; mixed numbers*]

1. The fraction $\frac{2}{3}$ is a proper fraction. In a proper fraction the _____ is less than the _____.

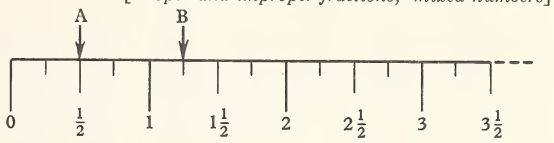
2. The fraction $\frac{4}{3}$ is an improper fraction because the _____ is greater than the _____.

3. The mixed number $2\frac{1}{8}$ means _____ plus _____. A mixed number is the sum of a _____ number and a _____.

4. Copy these numbers in the columns below to show what kind of number each is:

6	$\frac{5}{3}$	$33\frac{1}{3}$	217	$1\frac{6}{7}$
$\frac{1}{2}$	80	$\frac{7}{4}$	$\frac{4}{5}$	$\frac{19}{16}$
$3\frac{1}{4}$	$\frac{23}{8}$	$6\frac{3}{10}$	1,346	$\frac{75}{100}$

Whole Numbers	Mixed Numbers	Proper Fractions	Improper Fractions
------	------	------	------
------	------	------	------
------	------	------	------
------	------	------	------

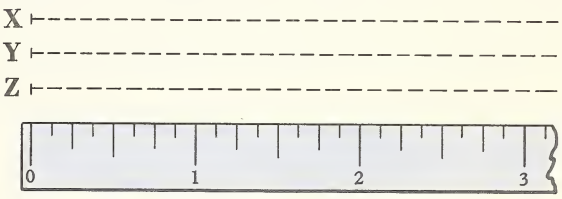


On the number line above, each number tells the distance on the line from 0 to that number.

5. A marks the distance from 0 to _____; B marks the distance from 0 to _____.

6. With arrows and letters, show these distances on the number line above:

C, $2\frac{1}{2}$ D, $1\frac{3}{4}$ E, $3\frac{1}{4}$ F, $\frac{1}{4}$



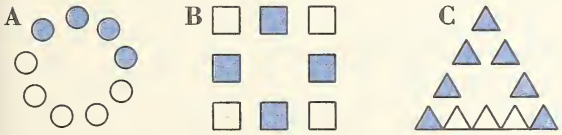
The diagram above shows part of a ruler. Each inch is divided into $\frac{1}{2}$'s, $\frac{1}{4}$'s, and $\frac{1}{8}$'s.

7. On line X, show a distance of $1\frac{1}{2}$ in.

8. On line Y, show a distance of $2\frac{3}{8}$ in.

9. On line Z, show a distance of $\frac{3}{4}$ in.

Equal Parts of a Group



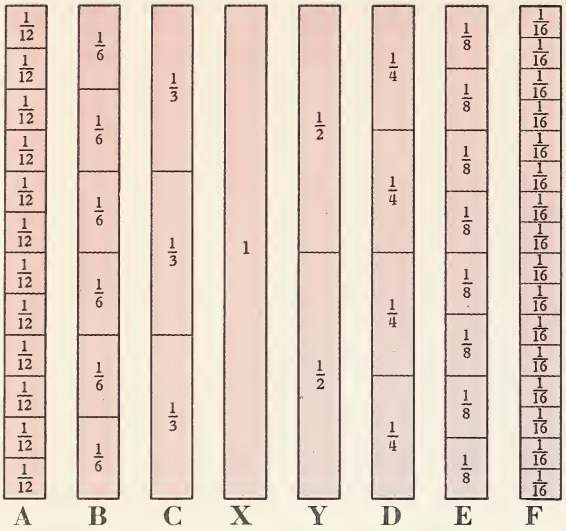
1. In A, there are _____ small circles, and _____ are colored; so $\frac{4}{9}$ of the group of circles is colored.

2. In B, _____ of the group of squares is colored.

3. In C, there are _____ triangles in all, and _____ triangles are colored. Each triangle is what part of the group? _____ What part of all the triangles is colored? _____

4. The fraction $\frac{3}{4}$ may mean _____ of the _____ equal parts of one thing, or it may mean _____ of the _____ equal things (parts) in a group of things.

[*Comparing fractions*]



1. Bar X stands for 1, or a whole thing. The other bars are divided into different numbers of equal parts. Above each bar, write the name of the fractional unit.

a. There are _____ $\frac{1}{2}$'s in 1.

b. There are _____ $\frac{1}{3}$'s in 1.

c. $\frac{\quad}{4} = 1$ d. $\frac{\quad}{6} = 1$ e. $\frac{\quad}{16} = 1$

f. $\frac{\quad}{8} = 1$ g. $\frac{\quad}{12} = 1$

2. Circle the larger fraction in each pair.

a. $\frac{1}{2}$ $\frac{1}{4}$ b. $\frac{1}{8}$ $\frac{1}{6}$ c. $\frac{3}{8}$ $\frac{3}{4}$

d. $\frac{1}{4}$ $\frac{1}{8}$ e. $\frac{1}{12}$ $\frac{1}{16}$ f. $\frac{2}{3}$ $\frac{5}{8}$

3. Write the missing numerators. If you need help, use the bars at the left.

a. $\frac{4}{8} = \frac{\quad}{2}$ b. $\frac{3}{4} = \frac{\quad}{8}$ c. $\frac{1}{2} = \frac{\quad}{12}$

d. $\frac{2}{6} = \frac{\quad}{3}$ e. $\frac{3}{8} = \frac{\quad}{16}$ f. $\frac{12}{16} = \frac{\quad}{4}$

4. Copy the fractions in each group in order of size, beginning with the smallest.

a. $\frac{1}{3}$, $\frac{1}{12}$, $\frac{1}{8}$, $\frac{1}{4}$ _____

b. $\frac{1}{8}$, $\frac{1}{2}$, $\frac{1}{16}$, $\frac{1}{6}$ _____

c. $\frac{1}{12}$, $\frac{1}{16}$, $\frac{1}{4}$, $\frac{1}{2}$ _____

5. Label bars Y and G below to show the size of each of the equal parts.

6. Supply the missing numbers below.

a. $\frac{2}{10} = \frac{\quad}{5}$

b. $\frac{1}{2} = \frac{\quad}{10}$

c. $\frac{10}{10} =$

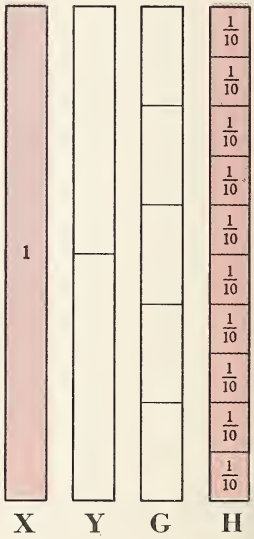
d. $\frac{3}{5} = \frac{\quad}{10}$

e. $\frac{8}{10} = \frac{\quad}{5}$

f. $\frac{5}{5} =$

g. $\frac{2}{5} = \frac{\quad}{10}$

h. $\frac{5}{10} = \frac{\quad}{2}$



7. Draw a circle around each of the fractions below that are equal to $\frac{1}{2}$.

$\frac{6}{12}$ $\frac{3}{4}$ $\frac{12}{16}$ $\frac{1}{3}$ $\frac{3}{8}$ $\frac{7}{12}$ $\frac{8}{16}$ $\frac{5}{8}$ $\frac{2}{4}$ $\frac{5}{12}$ $\frac{3}{6}$ $\frac{2}{3}$ $\frac{5}{10}$ $\frac{3}{5}$

$\frac{6}{16}$ $\frac{4}{6}$ $\frac{7}{8}$ $\frac{1}{4}$ $\frac{4}{8}$ $\frac{3}{16}$ $\frac{6}{8}$ $\frac{8}{12}$ $\frac{1}{8}$ $\frac{7}{16}$ $\frac{2}{6}$ $\frac{7}{10}$ $\frac{3}{10}$

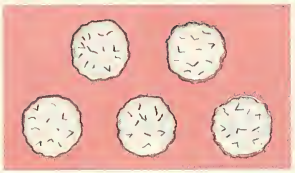
8. Draw a line under each of the fractions above that are greater than $\frac{1}{2}$.

9. Draw a square around each of the fractions above that are less than $\frac{1}{2}$.

A Fraction Means Division

1. Column (1) lists different ways of reading some fractions. Write the fractions in the usual way in column (2).

(1)	(2)
a. three $\frac{1}{4}$'s	_____
b. 7 tenths	_____
c. $4 \div 3$	_____
d. ten sevenths	_____
e. $7\overline{)10}$	_____
f. three fourths	_____
g. $4\overline{)3}$	_____
h. 4 thirds	_____
i. $7 \div 10$	_____
j. ten $\frac{1}{7}$'s	_____
k. $10\overline{)7}$	_____
l. four $\frac{1}{3}$'s	_____
m. $3\overline{)4}$	_____
n. $3 \div 4$	_____
o. seven $\frac{1}{10}$'s	_____
p. $10 \div 7$	_____



A	B
$2\frac{1}{2}$ $2\overline{)5}$ $\frac{4}{1}$	2, R1 $2\overline{)5}$ $\frac{4}{1}$

2. Suppose 5 cookies are divided equally between 2 boys.

a. In box C, draw the cookies that each boy can have.

C

b. Each boy can have _____ cookies.

c. Box ____ shows the division.

3. Suppose 5 stamps are divided equally between 2 girls.

a. Each girl can have ____ stamps, and there will be ____ stamp left.

b. Box ____ shows the division.

c. Why isn't it sensible to give the answer as $2\frac{1}{2}$ stamps?

_____

4. Write a problem about $9 \div 5$ in which you would give the answer with the remainder in a fraction.

_____

_____

Divide, and show any remainder in a fraction.

5. $7\overline{)25}$ **6.** $4\overline{)33}$ **7.** $5\overline{)42}$ **8.** $8\overline{)224}$ **9.** $6\overline{)485}$ **10.** $23\overline{)88}$

11. $3\overline{)26}$ **12.** $9\overline{)58}$ **13.** $4\overline{)39}$ **14.** $9\overline{)608}$ **15.** $7\overline{)635}$ **16.** $50\overline{)4,600}$

The Golden Rule of Fractions

[*Changing to higher or to lower terms*]

1. If you cut this pie into 6 equal pieces, the fractional unit is _____.

2. If the pie is cut into 3 equal pieces, the fractional unit is _____.

3. $\frac{1}{6}$ of the pie is _____ than $\frac{1}{3}$.
(*more, less*)

4. $\frac{2}{6}$ of the pie is the same as _____ third of it.

5. Of the equal fractions $\frac{2}{6}$ and $\frac{1}{3}$,

a. ____ has the larger fractional unit.

b. ____ has the smaller denominator.

6. The larger the fractional unit is, the _____ the denominator is.
(*smaller, larger*)

7. In the fraction $\frac{2}{6}$, the terms are ____ and ____.

8. You can change $\frac{2}{6}$ to $\frac{1}{3}$ without looking at a diagram if you divide both the 2 and the 6 by ____.

9. You can change $\frac{1}{3}$ to the equal fraction $\frac{2}{6}$ if you _____ both terms by ____.

The Golden Rule of Fractions

Multiplying or dividing both terms of a fraction by the same number does not change the value of the fraction.

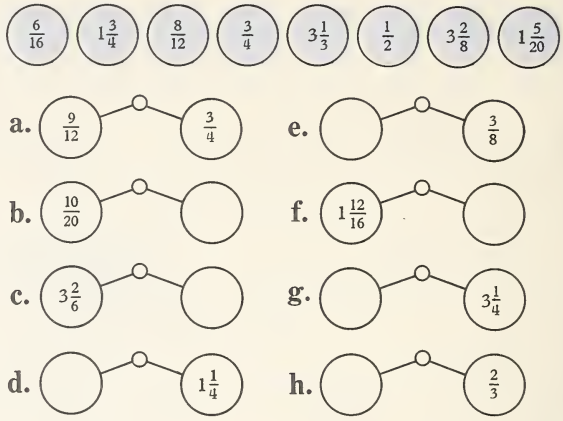
10. The fraction $\frac{1}{3}$ is in _____ terms than the equal fraction $\frac{2}{6}$.
(*lower, higher*)

11. Using the Golden Rule of Fractions, write the missing numerators and denominators in the fractions below.

a. $\frac{2}{5} = \frac{\quad}{25} = \frac{\quad}{10} = \frac{6}{\quad} = \frac{8}{\quad} = \frac{\quad}{100}$

b. $\frac{5}{6} = \frac{10}{\quad} = \frac{\quad}{24} = \frac{15}{\quad} = \frac{\quad}{36} = \frac{\quad}{30}$

12. Balance each pair of scales in Ex. **b–h** below by writing in the empty circle a number equal to the number in the other circle. Choose the numbers from the ones given in the colored circles. (The scales in Ex. **a** are balanced for you.)



Best Form for a Fraction

To be in best form, fractions in answers should be in lowest terms.

A fraction is in lowest terms when no number except 1 will exactly divide both its terms.

Reduce the fractions below to best form. Write the number by which you divide both terms. *Think* the divisions.

13.

	a	b	c
Original fraction:	$\frac{3}{12}$	$\frac{6}{16}$	$\frac{8}{28}$
Divide both terms by:			
Fraction in best form:			

14.

	a	b	c
Original fraction:	$\frac{4}{12}$	$\frac{12}{16}$	$\frac{18}{32}$
Divide both terms by:			
Fraction in best form:			

Changing Improper Fractions

[*To best form*]

The Boys' Club used 30 rolls at their picnic. How many dozen rolls were used?

1. How many are there in 1 doz.? _____

2. One roll is ____ of 1 doz. rolls.

3. 30 rolls are ____ $\frac{1}{12}$'s of a dozen, or $\frac{30}{12}$ of a dozen.

4. In the diagram, draw a ring around each $\frac{12}{12}$ to find how many dozen in $\frac{30}{12}$.

a. There are $2\frac{6}{12}$ _____ rolls.

b. 6 rolls are ____ dozen, so

$2\frac{6}{12}$ dozen $= 2\frac{\quad}{2}$ dozen.

30 = _?_ dozen 12 = 1 dozen

$\frac{30}{12} = 12\overline{)30} = 2\frac{6}{12} = 2\frac{1}{2}$ (doz.)

5. The improper fraction $\frac{30}{12}$ is in best form when it is changed to the mixed number _____.

6. To change an improper fraction to a whole number or a mixed number, divide its _____ by its _____.

Numbers are in best form if improper fractions have been changed to whole numbers or to mixed numbers, and if proper fractions are in lowest terms.

Change to best form. Show all the steps, but divide on separate paper.

7. $\frac{18}{8} =$

8. $\frac{57}{9} =$

9. $\frac{46}{6} =$

10. $\frac{100}{100} =$

11. $\frac{329}{4} =$

12. $\frac{23}{5} =$

13. $\frac{32}{4} =$

14. $\frac{84}{7} =$

15. $\frac{40}{6} =$

16. $\frac{126}{8} =$

17. $\frac{238}{7} =$

18. $\frac{300}{2} =$

19. $\frac{565}{5} =$

20. $\frac{732}{8} =$

21. $\frac{118}{6} =$

Adding and Subtracting Like-Fractions

A	B
$\frac{3}{8}$ $+\frac{7}{8}$ $\frac{10}{8} = 1\frac{2}{8} = 1\frac{1}{4}$	$\frac{9}{10}$ $-\frac{3}{10}$ $\frac{6}{10} = \frac{3}{5}$

1. Box A. The fraction $\frac{3}{8}$ means _____ $\frac{1}{8}$'s, or _____ of the 8 equal parts of a whole.

2. In $\frac{3}{8}$, the fractional unit is _____.

3. $\frac{3}{8}$ and $\frac{7}{8}$ are called like-fractions because they have the same fractional unit, as shown by their _____.

4. 3 eighths + 7 eighths = _____ eighths. 10 eighths written as a fraction is _____, which in best form is _____.

Fractions with the same fractional unit are called like-fractions.

5. Box B. $\frac{9}{10}$ and $\frac{3}{10}$ are like-fractions because the fractional unit for both is _____.

6. 9 tenths − 3 tenths = _____ tenths, which, as a fraction in lowest terms, is _____.

We can add or subtract like-fractions, that is, fractions with the same fractional unit.

7. From boxes A and B, copy

a. three proper fractions _____

b. an improper fraction _____

c. a mixed number _____

Read each problem carefully. Then circle "A." or "S." to show whether you will add or subtract. Write your work in the space at the right of the problem, and then write your answer on the line.

8. One candy bar weighed $\frac{4}{5}$ oz. and another weighed $\frac{3}{5}$ oz. How many ounces did the two together weigh?

A. S. Answer: _____

9. Joan used $\frac{5}{8}$ yd. of cloth for the skirt of an apron, and $\frac{1}{8}$ yd. for pocket and ties. How much cloth did she use?

A. S. Answer: _____

10. In Ex. 9, how much more cloth did Joan use for the skirt of the apron than for the pocket and ties?

A. S. Answer: _____

11. Jack washed storm windows for $\frac{3}{4}$ hr., spent $\frac{1}{4}$ hr. in pruning the rosebush, and raked leaves for $\frac{3}{4}$ hr. How long did he work in all?

A. S. Answer: _____

Adding and Subtracting Mixed Numbers

[Like-fractions without and with carrying and borrowing]

A	B	C	D	E	F
$2\frac{3}{10}$ $+\ 4\frac{1}{10}$ $6\frac{4}{10} = 6\frac{2}{5}$	$3\frac{3}{5}$ $+\ 5\frac{4}{5}$ $8\frac{7}{5} = 9\frac{2}{5}$	$4\frac{5}{6}$ $+\ 2\frac{5}{6}$ $6\frac{10}{6} = 7\frac{4}{6} = 7\frac{2}{3}$	$6\frac{7}{8}$ $-\ 4\frac{3}{8}$ $2\frac{4}{8} = 2\frac{1}{2}$	$8 = 7\frac{4}{4}$ $-\ 3\frac{3}{4} = 3\frac{3}{4}$ $4\frac{1}{4}$	$9\frac{1}{6} = 8\frac{7}{6}$ $-\ 4\frac{5}{6} = 4\frac{5}{6}$ $4\frac{2}{6} = 4\frac{1}{3}$

The examples in the boxes will remind you how to add and subtract mixed numbers.

Watch the carrying in addition and the borrowing in subtraction.

Add. Always change answers to best form.

	a	b	c	d	e
1.	$4\frac{2}{3}$ $+\ 3$	$2\frac{3}{8}$ $+\ 4\frac{1}{8}$	$5\frac{7}{16}$ $+\ 1\frac{9}{16}$	$1\frac{1}{2}$ $+\ 2\frac{1}{2}$	$6\frac{5}{8}$ $+\ 2\frac{5}{8}$
2.	$5\frac{7}{32}$ $+\ 2\frac{5}{32}$	8 $+\ 1\frac{7}{16}$	$3\frac{1}{4}$ $+\ 3\frac{3}{4}$	$2\frac{4}{9}$ $+\ 4\frac{7}{9}$	$2\frac{3}{10}$ $+\ 3\frac{9}{10}$
3.	$9\frac{3}{5}$ $+\ \frac{4}{5}$	$\frac{1}{6}$ $+\ 1\frac{5}{6}$	$2\frac{4}{5}$ $+\ 6\frac{4}{5}$	$7\frac{1}{6}$ $+\ 2\frac{1}{6}$	$1\frac{5}{12}$ $+\ 7\frac{11}{12}$

Subtract. Be sure your answers are in best form.

4.	$7\frac{5}{8}$ $-\ 4\frac{3}{8}$	$8\frac{3}{4}$ $-\ 6\frac{1}{4}$	9 $-\ 3\frac{3}{5}$	$8\frac{5}{6}$ $-\ 2\frac{1}{6}$	$11\frac{1}{4}$ $-\ 4\frac{3}{4}$
5.	6 $-\ 4\frac{2}{3}$	$4\frac{7}{8}$ $-\ 2\frac{7}{8}$	$2\frac{15}{16}$ $-\ 2\frac{13}{16}$	$5\frac{1}{6}$ $-\ 2\frac{5}{6}$	4 $-\ 3\frac{1}{7}$
6.	$9\frac{3}{8}$ $-\ 4\frac{5}{8}$	$6\frac{15}{32}$ $-\ 3\frac{9}{32}$	$7\frac{1}{12}$ $-\ 3\frac{7}{12}$	$4\frac{1}{16}$ $-\ 2\frac{7}{16}$	$5\frac{3}{10}$ $-\ 3\frac{9}{10}$

Adding and Subtracting Unlike-Fractions

[Common denominator present; carrying and borrowing]

A	B	C	D
$\frac{2}{3} = \frac{4}{6}$ $+\frac{5}{6} = \frac{5}{6}$ $\frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$	$4\frac{3}{4} = 4\frac{6}{8}$ $+1\frac{5}{8} = 1\frac{5}{8}$ $5\frac{11}{8} = 6\frac{3}{8}$	$3\frac{1}{6} = 2\frac{7}{6}$ $-1\frac{1}{2} = 1\frac{3}{6}$ $1\frac{4}{6} = 1\frac{2}{3}$	$8 = 7\frac{16}{16}$ $-5\frac{5}{16} = 5\frac{5}{16}$ $2\frac{11}{16}$

1. Show the addition of $\frac{2}{3}$ and $\frac{5}{6}$ on the number line above, as follows:

a. Draw an arrow, lettered A, to show the point $\frac{2}{3}$ to the right of 0.

b. Draw an arrow, lettered B, to show the point that is $\frac{5}{6}$ to the right of A.

c. Your arrow B points to $1\frac{\quad}{6}$, or $1\frac{\quad}{2}$.

2. The point A shows that $\frac{2}{3} = \frac{\quad}{6}$.

$\frac{2}{3} + \frac{5}{6} = \frac{\quad}{6} + \frac{5}{6} = \frac{\quad}{6} = 1\frac{\quad}{6} = 1\frac{\quad}{2}$.

3. $\frac{4}{6}$ and $\frac{5}{6}$ are _____-fractions; $\frac{2}{3}$ and $\frac{5}{6}$ are _____-fractions.

4. The common denominator of $\frac{4}{6}$ and $\frac{5}{6}$ is _____. The common fractional unit is _____.

Fractions with a common fractional unit have a common denominator.

In each pair change one fraction so that the fractions will have a common denominator.

5. $\frac{1}{4}$ $\quad$ $\frac{5}{8}$

6. $\frac{2}{3}$ $\quad$ $\frac{7}{12}$

7. $\frac{3}{5}$ $\quad$ $\frac{3}{10}$

8. $\frac{5}{6}$ $\quad$ $\frac{1}{3}$

9. $\frac{1}{16}$ $\quad$ $\frac{1}{8}$

10. $\frac{5}{16}$ $\quad$ $\frac{3}{4}$

11. In Ex. 5–10, did you change to the larger or the smaller fractional unit? _____

Add or subtract. First be sure that you understand the work in boxes A–D above.

	a	b	c	d
12.	$\frac{4}{5}$ $+\frac{7}{10}$	$\frac{3}{8}$ $+\frac{1}{4}$	$2\frac{2}{3}$ $+\frac{5}{6}$	$6\frac{1}{2}$ $+2\frac{5}{8}$
13.	$4\frac{7}{12}$ $+1\frac{1}{4}$	$\frac{5}{16}$ $+8\frac{3}{4}$	$\frac{3}{10}$ $+1\frac{3}{5}$	$3\frac{9}{10}$ $+5\frac{3}{5}$
14.	$\frac{7}{8}$ $-\frac{5}{16}$	$\frac{2}{3}$ $-\frac{1}{6}$	$8\frac{5}{12}$ $-5\frac{5}{6}$	$3\frac{3}{5}$ $-2\frac{7}{10}$
15.	$9\frac{1}{10}$ $-7\frac{3}{5}$	$\frac{15}{16}$ $-\frac{5}{8}$	7 $-2\frac{1}{2}$	$12\frac{1}{2}$ $-9\frac{3}{4}$

The Talent Show

1. In the Talent Show, $\frac{1}{2}$ of the time was allowed for singing, and $\frac{1}{8}$ of the time for comedy acts.

a. Was more or less time allowed for singing than for comedy?

b. What part of the time was left for other kinds of acts?

2. To make posters for the show, Joe and Tom used some large sheets of heavy paper, all the same size. Joe cut his sheets into fourths; Tom cut his into halves.

a. Whose posters were larger?

b. Joe cut up 2 large sheets, and Tom cut up 3. How many posters was that?

3. There were 12 acts in the show, and 24 contestants. What was the average number of contestants in an act?

4. The Talent Show began at 7:45 P.M. and ended at quarter past 9. How long did it last?

5. From Ex. 3 and 4, find the average length of an act.

6. Tickets for the show cost 40¢ for adults and 25¢ for children. The total sales were 200 tickets for adults and 100 tickets for children. How much money was received for the tickets?

Number Tricks and Puzzles

1. There are many ways of writing 100 without using zero. Explain Ex. **a** and **b**.

a. $99\frac{9}{9} = 100$ because

b. $98 + 1 + \frac{1}{2} + \frac{27}{54} = 100$ because

2. Write 78, using only the figure 7, but repeating it as often as you wish.

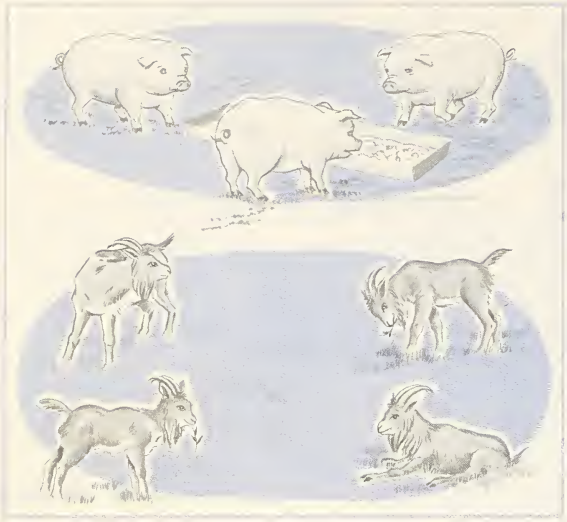
3. Write nineteen, using four 9's.

4. Write two, using four 7's.

5. Years ago there was a town in which $\frac{1}{8}$ of all the people were one-legged, and $\frac{1}{2}$ of all the others went barefoot. How many shoes were needed?

Adding and Subtracting Unlike-Fractions

[*Common denominator not present*]



1. The sum of 3 pigs and 4 goats can be neither pigs nor goats. But 3 pigs and 4 goats are 7 animals.

You cannot add or subtract things unless they are _____.

You cannot add or subtract fractions unless they have the same _____ _____.

$\frac{1}{2}$		$\frac{1}{2}$			
$\frac{1}{3}$		$\frac{1}{3}$		$\frac{1}{3}$	
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Use the diagram for help in Ex. 2–5.

2. A fractional unit that measures both $\frac{1}{3}$ and $\frac{1}{2}$ is ____; so a common denominator for $\frac{1}{3}$ and $\frac{1}{2}$ is ____.

Add or subtract in Ex. 3 and 4.

3. $\frac{1}{2} = \frac{\quad}{6}$

$+\frac{1}{3} = \frac{\quad}{6}$

4. $\frac{1}{2} = \frac{\quad}{6}$

$-\frac{1}{3} = \frac{\quad}{6}$

5. In the diagram, mark the bar for $\frac{1}{2}$'s to show $\frac{1}{4}$'s. Mark the bar for $\frac{1}{6}$'s to show $\frac{1}{12}$'s.

The diagram now shows that a common fractional unit for $\frac{2}{3}$ and $\frac{3}{4}$ is ____.

6. A short way to find a common denominator for $\frac{2}{3}$ and $\frac{3}{4}$ is to _____ (*add; multiply*) together the two given denominators, 3 and ____. The common denominator is _____.

$\frac{2}{3} + \frac{3}{4} = \frac{\quad}{12} + \frac{\quad}{12} = \frac{\quad}{12} =$ _____

7. To add $\frac{1}{4}$ and $\frac{3}{10}$, you could find a common denominator by _____ together the given denominators. Then the common denominator would be _____.

Change $\frac{1}{4}$ and $\frac{3}{10}$ to fractions with the fractional unit $\frac{1}{40}$ and add.

$\frac{1}{4} + \frac{3}{10} =$ _____

8. It is better to use the smallest common denominator. To find the smallest common denominator for $\frac{1}{4}$ and $\frac{3}{10}$, begin with 10, the larger of the given denominators.

Does 10 exactly contain 4, the other denominator? _____

Try 2×10, or _____. Does 20 exactly contain 4? _____ Is 20 the smallest common denominator for $\frac{1}{4}$ and $\frac{3}{10}$? _____

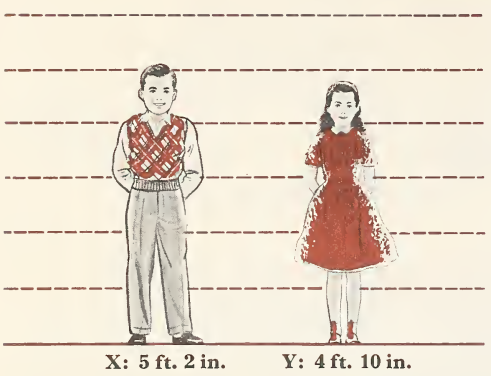
To find the smallest common denominator when no given denominator is a common denominator, multiply the largest given denominator first by 2, then by 3, and so on, until you get a number that exactly contains all the given denominators.

Practice in Adding and Subtracting Fractions

Add or subtract as the sign tells you. In each example, use the smallest common denominator.

	a	b	c	d
1.	$\frac{1}{6}$ $\frac{2}{3}$ $+\frac{5}{9}$	$\frac{2}{3}$ $\frac{3}{8}$ $+\frac{5}{6}$	$\frac{3}{4}$ $\frac{1}{3}$ $+\frac{1}{2}$	$\frac{2}{5}$ $\frac{1}{4}$ $+\frac{1}{10}$
2.	$8\frac{4}{5}$ $-5\frac{1}{2}$	$16\frac{1}{3}$ $-4\frac{1}{2}$	$7\frac{5}{8}$ $-5\frac{7}{12}$	$8\frac{7}{10}$ $-3\frac{3}{4}$
3.	$9\frac{1}{4}$ $-6\frac{1}{10}$	$11\frac{5}{12}$ $-3\frac{3}{8}$	$2\frac{1}{2}$ $-\frac{3}{5}$	$25\frac{3}{4}$ $-12\frac{2}{3}$
4.	$6\frac{1}{3}$ $-5\frac{1}{4}$	$18\frac{1}{5}$ $-4\frac{3}{4}$	$16\frac{7}{12}$ $-3\frac{3}{16}$	$\frac{3}{4}$ $+\frac{5}{8}$
5.	$2\frac{1}{3}$ $+3\frac{5}{12}$	$1\frac{1}{6}$ $+1\frac{2}{3}$	$4\frac{7}{8}$ $+4\frac{3}{16}$	$3\frac{1}{8}$ $-1\frac{5}{16}$
6.	$2\frac{2}{5}$ $+1\frac{1}{2}$	$7\frac{2}{3}$ $-5\frac{1}{2}$	$8\frac{3}{4}$ $+3\frac{1}{2}$	$6\frac{5}{6}$ $-5\frac{2}{3}$
7.	$12\frac{7}{8}$ $+7\frac{3}{4}$	$7\frac{1}{6}$ $+8\frac{1}{3}$	$9\frac{1}{3}$ $-6\frac{3}{4}$	$11\frac{1}{4}$ $-7\frac{1}{6}$

Rounding Mixed Numbers



X: _____ ft. Y: _____ ft.

1. On the lines above, write the heights of X and Y in feet, as mixed numbers.

1 ft. = 12 in., so 1 in. = ____ ft.

2. X's height comes between 5 ft. and ____ ft. but nearer to ____ ft. than to ____ ft. So, rounded to the nearest whole number, X's height is given as ____ ft.

3. To the nearest foot, Y is ____ ft. tall.

4. Both X and Y are about ____ ft. tall.

5. In rounding $5\frac{1}{6}$ to 5, you dropped the fraction because $\frac{1}{6}$ is _____ than $\frac{1}{2}$.

6. In rounding $4\frac{5}{6}$ to 5, you counted $\frac{5}{6}$ as 1, because $\frac{5}{6}$ is _____ than $\frac{1}{2}$.

In rounding a mixed number, when the fraction is equal to or greater than $\frac{1}{2}$, add 1 to the whole number and drop the fraction. When the fraction is less than $\frac{1}{2}$, drop it.

Round to the nearest whole number.

7. $\frac{3}{4}$ _____ $\frac{5}{8}$ _____ $\frac{13}{16}$ _____ $1\frac{5}{12}$ _____

8. $14\frac{7}{8}$ _____ $5\frac{1}{3}$ _____ $3\frac{1}{9}$ _____ $9\frac{1}{2}$ _____

Estimate the answers by rounding.

9. $1\frac{1}{4} + 2\frac{7}{8}$ 1 + 3 = _____

10. $9\frac{3}{4} - 5\frac{3}{16}$ _____ − _____ = _____

11. $3\frac{3}{8} + 2\frac{5}{6}$ _____ + _____ = _____

12. $1\frac{5}{16} + 2\frac{1}{4} - 1\frac{5}{8}$

_____ + _____ − _____ = _____

13. $1\frac{7}{8} - \frac{5}{12} + 2\frac{2}{3}$

_____ − _____ + _____ = _____

14. $3\frac{1}{6} + 2\frac{9}{10} + \frac{8}{9}$

_____ + _____ + _____ = _____

Is It True? Answer "Yes" or "No"!

1. Are $\frac{3}{4}$ and $\frac{3}{8}$ like-fractions? _____

2. In $\frac{5}{6}$, is the numerator 5? _____

3. Is $3\frac{1}{3}$ a fractional unit? _____

4. Can $\frac{9}{24}$ be reduced? _____

5. Has $\frac{2}{4}$ the same value as $\frac{5}{10}$? _____

6. Do 4 tablespoons equal $\frac{1}{2}$ cup? _____

7. Is $\frac{1}{7}$ the fractional unit in $\frac{7}{16}$? _____

8. Does $\frac{5}{8}$ mean $5 \div 8$? _____

9. Does $\frac{1}{2} + \frac{1}{3} = \frac{1+1}{2+3} = \frac{2}{5}$? _____

10. Are there 2 cups in 1 pint? _____

11. Is $\frac{27}{35}$ in lowest terms? _____

12. Is $\frac{11}{16}$ less than $\frac{7}{12}$? _____

13. Do 6 qt. equal $\frac{3}{4}$ pk.? _____

14. Does a leap year have 366 da.? _____

Look before You Leap! Think before You Solve!

[Helps in problem-solving]

You should think about a problem before you try to solve it. There are several ways to do this.

A. What are you to find?

On the lines below each of problems 1–3, write what you are to find.

1. Tom had 55¢ left after he spent 35¢. How much money did he have at first?

---

2. Sam earned $1.20 for 2 hours of work. What was his hourly pay?

---

3. Celia bought 2 records at 39¢ each. How much did she spend?

B. Decide whether a problem tells about groups to be combined or a group to be separated from another group or a group to be compared with another group.

On the lines below each of problems 4–6, tell about the groups in this way.

4. Ann's sister bought a handbag for $3.50 and gloves for $1.35. How much more did she spend for the bag than for the gloves?

---

5. Judy's mother doubled the recipe for some cookies that required 2 cups of flour. How much flour did she use?

---

6. Jim had 292 bricks for the brick walk he is making. He has used 189 bricks. How many bricks does Jim have left?

C. Decide whether to add, subtract, multiply, or divide.

On the lines below problems 7–9, write the names of the processes that you will use to solve the problems.

7. Joe allows himself 10 min. to get dressed, 5 min. to clear up his room, and 15 min. for breakfast. If Joe leaves the house at 7:45 A.M., at what time should he get up?

---

8. The school spent $63.51 for 29 new books. How much did each book cost?

---

9. In 5 games a basketball team had the following scores: 59, 73, 77, 64, 82. Find the average number of points scored per game.

D. It is a good idea to estimate the answer before you work a problem.

For each of problems 1, 3, 4, 6, 8, and 9, use round numbers and estimate the answer. Write the estimated answer at the end of the line below the problem.

Now go back and solve each problem. Do your work on a separate paper and write your answers below.

1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____ 8. _____

9. _____

The Tree House

Last summer, Bill's grandfather helped Bill make a house in a big tree.

1. The platform was 8 ft. long and 6 ft. wide. What was its area?

_____ sq. ft.

2. Grandfather said that 1 gal. of paint covers about 400 sq. ft.

a. How many square feet would 1 qt. of paint cover?

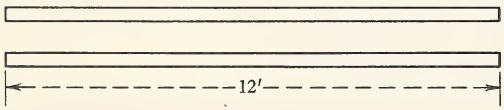
_____

b. About how much paint would be needed to give the platform 2 coats of paint?

_____

3. Bill cut up two planks to make braces for the platform. Each long brace was 4 ft. long, and the short braces were each 3 ft. long.

a. Mark the diagram below to show how you would cut 4 long braces and 2 short braces from the two 12-foot planks.



b. Use color to show what is left after cutting all the braces. What is the total length of the plank left?

_____

4. One day, Bill and Grandfather each worked 5 hr. Joe helped 2 hr. in the morning, and Ed and Tom each worked 2 hr. in the afternoon. This was equal to how many hours of one person's time?

_____

5. For a hoist to haul up supplies, Bill bought a pail for 59¢ and 15 ft. of rope at 5¢ a foot. The hoist cost how much?

_____

6. After the first rain, Bill wanted a canvas roof for the tree house. To allow for the slant and the eaves, Grandfather said they needed a piece of canvas 2 ft. longer and 1 ft. wider than the platform.

a. Mark at the right the dimensions of the canvas.

b. They needed _____ square feet of canvas.

Testing What You Have Learned

[*Cumulative Review*]

1. Write the fractional unit for each of these fractions:

$\frac{5}{12}$ ____ $\frac{3}{8}$ ____ $\frac{6}{7}$ ____ $\frac{7}{10}$ ____

2. Draw a ring around the larger fraction in each pair below.

$\frac{1}{5}, \frac{1}{4}$ $\frac{2}{3}, \frac{7}{12}$ $\frac{1}{8}, \frac{1}{6}$ $\frac{4}{9}, \frac{4}{10}$

3. Change each fraction to an equal fraction.

$\frac{6}{8} = \frac{\quad}{4}$ $\frac{10}{16} = \frac{\quad}{8}$ $\frac{5}{10} = \frac{\quad}{2}$

$\frac{1}{2} = \frac{\quad}{8}$ $\frac{9}{12} = \frac{\quad}{4}$ $\frac{6}{9} = \frac{\quad}{3}$

4. Change to best form.

$\frac{19}{3} =$ $\frac{6}{6} =$ $1\frac{6}{8} =$ $\frac{18}{4} =$

$\frac{22}{7} =$ $3\frac{8}{12} =$ $\frac{14}{16} =$ $\frac{200}{3} =$

5. Add or subtract. Write answers in best form.

a. $\frac{3}{5} + \frac{1}{5} =$ **b.** $\frac{7}{9} - \frac{4}{9} =$

c. $\frac{15}{16} - \frac{7}{16} =$ **d.** $\frac{11}{12} + \frac{5}{12} =$

e. $4\frac{5}{6} + 6\frac{2}{3}$ **f.** $9\frac{1}{2} - 7\frac{9}{10}$

g. $8\frac{3}{10} - 4\frac{4}{5}$ **h.** $2\frac{13}{16} + 5\frac{7}{8}$

i. $6 - 2\frac{5}{6}$ **j.** $8\frac{1}{3} - 3\frac{1}{4}$

k. $7\frac{1}{2} + 2\frac{3}{5}$ **l.** $5\frac{5}{8} - 2\frac{5}{6}$

6. Divide. Write any remainder in a fraction in the quotient.

a. $5\overline{)192}$ **b.** $8\overline{)236}$ **c.** $4\overline{)304}$

d. $6\overline{)520}$ **e.** $3\overline{)417}$ **f.** $7\overline{)905}$

7. Find the following fractional parts:

a. $\frac{1}{2}$ of 8 = _____ **d.** $\frac{1}{4}$ of 10 = _____

b. $\frac{1}{3}$ of 12 = _____ **e.** $\frac{1}{7}$ of 14 = _____

c. $\frac{1}{5}$ of 23 = _____ **f.** $\frac{1}{6}$ of 15 = _____

Add or subtract.

8. 235 + 107 + 692

9. 3,012 + 960 + 2,159

10. 6,375 + 8,680 + 40,096

11. 782 − 595

12. 1,576 − 807

13. \$152.98 − 103.79

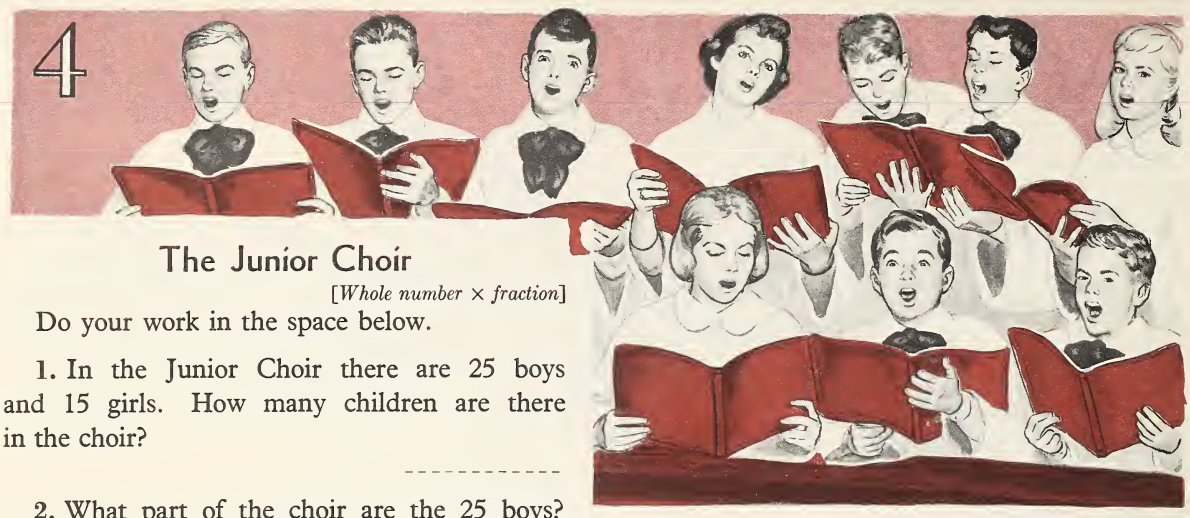
Multiply. Write all your work here.

14. 486 × 23

15. 5,127 × 47

16. \$69.75 × 58

4



The Junior Choir

[*Whole number* × *fraction*]

Do your work in the space below.

1. In the Junior Choir there are 25 boys and 15 girls. How many children are there in the choir?

---

2. What part of the choir are the 25 boys? ____ the 15 girls? ____

3. It takes $\frac{5}{6}$ yd. of silk for each tie. How much silk is needed for 25 ties?

---

4. A collar can be made from $\frac{3}{8}$ yd. of material. For 40 collars, how many yards are needed?

---

5. Last week the choir rehearsed $\frac{1}{2}$ hr. on Sunday, $\frac{3}{4}$ hr. on Thursday, and $1\frac{1}{2}$ hr. on Friday. How much time did they rehearse last week?

---

6. This week the choir has rehearsed $\frac{3}{4}$ hr. on each of 3 days. This is how many hours in all?

Space for Work

Multiply as shown in Ex. 7. Give answers in best form.

7. $4 \times \frac{5}{8} = \frac{4 \times 5}{8} = \frac{20}{8} = 2\frac{4}{8} = 2\frac{1}{2}$

8. $8 \times \frac{3}{4} =$

9. $10 \times \frac{2}{3} =$

10. $4 \times \frac{1}{16} =$

11. $6 \times \frac{5}{6} =$

12. $9 \times \frac{1}{3} =$

13. $5 \times \frac{7}{8} =$

14. $3 \times \frac{5}{12} =$

Multiplying a Mixed Number by a Whole Number

A

Change $2\frac{3}{4}$ to an improper fraction.

$1 = \frac{4}{4}$, so $2 = 2 \times \frac{4}{4} = \frac{2 \times 4}{4} = \frac{8}{4}$

$2\frac{3}{4} = 2 + \frac{3}{4} = \frac{8}{4} + \frac{3}{4} = \frac{11}{4}$

1. Look at the diagram in box A. How many fourths are shown in all? _____

The diagram shows that $2\frac{3}{4} = \frac{\quad}{4}$.

2. Box A also shows all the steps in changing $2\frac{3}{4}$ to $\frac{11}{4}$. Study the work.

In changing a mixed number to an improper fraction, how do we know the fractional unit of the improper fraction?

_____

_____

Change these mixed numbers to improper fractions. Change the whole-number part in your head and write your work as in Ex. 3.

3. $4\frac{7}{8} = \frac{32}{8} + \frac{7}{8} = \frac{\quad}{8}$

4. $6\frac{2}{5} =$ _____

5. $8\frac{1}{2} =$ _____

6. $7\frac{1}{4} =$ _____

7. $4\frac{5}{6} =$ _____

8. $5\frac{3}{10} =$ _____

9. $3\frac{7}{9} =$ _____

B

$5 \times 2\frac{3}{4} = 5 \times \frac{11}{4} = \frac{5 \times 11}{4} = \frac{55}{4} = 13\frac{3}{4}$

Box B shows one way to multiply a mixed number by a whole number.

10. In box B we first change the mixed number to an _____ fraction. Then we work just as we do in multiplying any _____ by a whole number.

11. Box C shows another way to multiply a mixed number by a whole number.

In box C, how do we get the first partial product, $3\frac{3}{4}$?

C

$$\begin{array}{r} 2\frac{3}{4} \\ \times\ 5 \\ \hline 3\frac{3}{4} \quad (5 \times \frac{3}{4}) \\ 10 \quad (5 \times 2) \\ \hline 13\frac{3}{4} \end{array}$$

_____

How do we get the second partial product, 10? _____

In Ex. 12–16, multiply as in box B. In Ex. 17–19, multiply as in box C.

12. $2 \times 3\frac{4}{5} =$

13. $3 \times 5\frac{2}{3} =$

14. $6 \times 8\frac{3}{4} =$

15. $8 \times 2\frac{5}{6} =$

16. $7 \times 3\frac{1}{7} =$

17. $6\frac{5}{12} \times 4$

18. $9\frac{3}{8} \times 4$

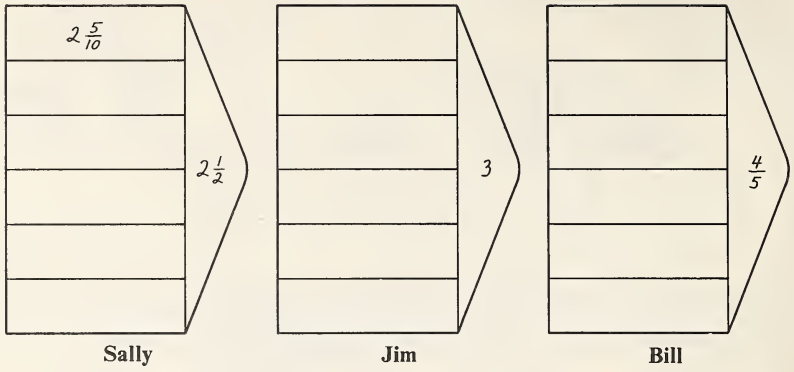
19. $3\frac{8}{9} \times 6$

Envelopes of Fractions—A Game

One rainy day, Grandma showed Sally and her cousins Jim and Bill a game with fractions.

Each player had an envelope ruled as shown at the right, with a number on the flap.

On a large sheet of brown paper, Grandma wrote some numbers and examples.



The game is to copy on the envelope all the numbers and examples which fit the number on the flap.

Below are Grandma's numbers and examples. Finish Sally's envelope, and then do Jim's and Bill's.

$2\frac{5}{10}$	$\frac{12}{4}$	$7 - 4$	$1\frac{3}{8} + 1\frac{5}{8}$	$3 - \frac{1}{2}$	$6 \div 2$
$2 \times 1\frac{1}{2}$	$1\frac{1}{4} + 1\frac{1}{4}$	$2\frac{5}{12} + \frac{7}{12}$	$2 - 1\frac{1}{5}$	$\frac{5}{2}$	$2 \times \frac{2}{5}$
$1 - \frac{1}{5}$	$\frac{1}{5} + \frac{3}{5}$	$1\frac{5}{8} + \frac{7}{8}$	$2 \times 1\frac{1}{4}$	$\frac{8}{10}$	$\frac{12}{15}$

The Game of Letters

Grandma showed the children another game. She gave them the words, "Fractions in Arithmetic," and told them to use the letters to spell as many words as possible. She made these rules:

1. Use each letter only once. Cross out each letter as you use it.

2. You must not make more than one 2-letter word.

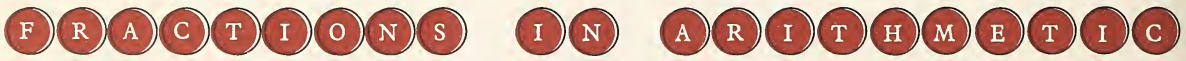
3. No 1-letter words are allowed.

4. Count your score as follows:

Give yourself 1 for each letter used.
Give yourself 5 for each word made.
Subtract 2 for each letter not used.

Grandma said, "You can use all the letters if you try!"

Now you play the game of letters.



Words

Score

Count for letters used: ------

Count for words made: + ------

Sum: ------

Subtract for letters not used: − ------

Score: ------

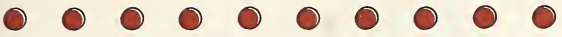
Multiplying a Whole Number by a Fraction

1. Draw lines to divide the 8 squares into 4 equal groups.

a. Put X on $\frac{1}{4}$ of the squares.

b. There are ____ in each of the 4 equal parts of 8.

c. $\frac{1}{4}$ of 8 = ____



2. Draw a ring around $\frac{3}{5}$ of the dots above.

a. How many dots are inside the ring? ____

b. $\frac{3}{5}$ of 10 = ____

c. Does the diagram show that the result in the box below is correct? _____

$$\frac{3}{5} \text{ of } 10 = \frac{3}{5} \times 10 = \frac{3 \times 10}{5} = \frac{30}{5} = 6$$

3. $10 \times \frac{3}{5}$ = _____

a. Is this result the same as the product of $\frac{3}{5} \times 10$ in the box above? _____

b. You know that you can reverse factors like 2×3; that is, 2×3 = _____, and 3×2 = _____.

The box shows that you can multiply $\frac{3}{5} \times 10$ just as you multiply $10 \times \frac{3}{5}$.

$\frac{1}{4} \times 8$ has the same value as $8 \times \frac{1}{4}$.

c. We usually read $\frac{1}{4} \times 8$ as "$\frac{1}{4}$ of 8," and $\frac{3}{5} \times 10$ as "_____."

4. Draw a diagram below to show how many $\frac{2}{3}$ of 6 are.

$\frac{2}{3}$ of 6 = ____

Find the products as in the box. Give answers in best form.

5. $\frac{5}{8} \times 24$ =

6. $\frac{7}{10} \times 105$ =

7. $\frac{5}{6} \times 4$ =

8. $\frac{1}{5} \times 29$ =

9. $\frac{3}{8} \times 27$ =

10. $\frac{5}{9} \times 84$ =

11. $\frac{3}{4} \times 18$ =

12. $\frac{5}{16} \times 20$ =

Below each problem, write its solution.

13. Ann bought $\frac{3}{4}$ yd. of ribbon. How many inches was that?

_____

14. Jack ran $\frac{1}{4}$ mile. How many yards did he run? (1 mi. = 1,760 yd.)

_____

15. It takes Sam's father $\frac{3}{4}$ hr. to go from his house to his office. How many minutes is that?

_____

16. On the day of the bad storm, $\frac{1}{3}$ of Joe's class of 42 pupils were absent. How many pupils were absent?

_____

Multiplying a Fraction by a Fraction

1. Mother said, "There's half an apple pie in the pantry. You three boys may divide it equally among you."

What part of the whole pie did each boy get?

a. The half pie is divided into 3 equal pieces, so each boy gets ____ of $\frac{1}{2}$ pie.

b. In the whole pie there are ____ halves, so in the whole pie there are 2×3, or ____, pieces of the size that each boy gets.

c. Each boy gets ____ of the whole pie.

$\frac{1}{3}$ of $\frac{1}{2}$ pie $= \frac{1}{6}$ of the whole pie.

2. Mark or color the diagram above to show $\frac{1}{4}$'s. Then mark $\frac{2}{3}$ of $\frac{3}{4}$.

$\frac{2}{3}$ of $\frac{3}{4}$ of the bar $=$ ____ of the bar.

3. Sam's father spends $\frac{3}{4}$ hr. in going from his home to his office. (See Ex. 15, page 73.) For $\frac{2}{3}$ of that time he rides on the bus. He walks the rest of the way. How long is he on the bus?

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{\quad}{\quad} = \frac{\quad}{\quad} \text{ (hour)}$$

Does your answer agree with the diagram in Ex. 2 above? _____

Multiply. Give answers in best form.

4. $\frac{2}{5} \times \frac{7}{8} =$

5. $\frac{5}{9} \times \frac{3}{5} =$

6. $\frac{1}{3} \times \frac{5}{6} =$

7. $\frac{1}{4} \times \frac{1}{4} =$

8. $\frac{4}{7} \times \frac{7}{10} =$

9. $\frac{3}{4} \times \frac{5}{9} =$

10. $\frac{5}{16} \times \frac{7}{10} =$

11. $\frac{3}{10} \times \frac{5}{6} =$

12. $\frac{4}{5} \times \frac{15}{16} =$

Find answers for problems 13 and 14 by doing your work in the spaces provided. Be sure your answers are in best form.

13. Ann's mother had $\frac{2}{3}$ yd. of red calico. She used $\frac{1}{2}$ of it for pockets on an apron. How many inches did she use for pockets?

a. Change $\frac{2}{3}$ yd. to inches and find $\frac{1}{2}$ of the number of inches.

b. Find $\frac{1}{2}$ of $\frac{2}{3}$ yd., and change to inches.

c. Are your answers in **a** and **b** the same?

_____

14. Kate's sister planned to make some pickles. The recipe called for 12 cucumbers, but she had only 8 cucumbers.

a. What fraction of each of the other ingredients should she use if she uses only 8 cucumbers?

_____

b. The recipe for 12 cucumbers requires $\frac{3}{4}$ cup of salt. How much salt should she use for 8 cucumbers?

_____

Multiplying a Mixed Number by a Fraction

1. The pail that Bill used as a hoist for his tree house (page 68) held $2\frac{1}{2}$ gal. Grandfather told Bill to fill it only $\frac{4}{5}$ full of water, to avoid spilling.

a. Draw a line to show the water line when the pail is $\frac{4}{5}$ full.

b. $\frac{4}{5}$ of the pail is _____ gallons. (See the gallon line.)

To find $\frac{4}{5}$ of $2\frac{1}{2}$ with figures, you can change the mixed number to an improper fraction and multiply as you do with any fractions.

$$2\tfrac{1}{2} = \tfrac{4}{2} + \tfrac{1}{2} = \tfrac{5}{2}$$
$$\tfrac{4}{5} \times \tfrac{5}{2} = \tfrac{4 \times 5}{5 \times 2} = \tfrac{20}{10} = 2$$

c. Does the diagram show that the multiplication in the box is correct?

_____

Multiply. Change the mixed numbers to improper fractions in your head if you can. Give answers in best form.

2. $\frac{5}{6} \times 10\frac{1}{2} =$

3. $\frac{1}{4} \times 5\frac{1}{3} =$

4. $\frac{1}{2} \times 6\frac{4}{5} =$

5. $\frac{3}{10} \times 4\frac{4}{9} =$

6. $\frac{1}{3} \times 5\frac{2}{5} =$

7. $\frac{4}{5} \times 5\frac{5}{6} =$

8. $\frac{1}{8} \times 3\frac{3}{7} =$

9. $\frac{5}{8} \times 3\frac{1}{5} =$

10. $\frac{3}{7} \times 5\frac{5}{6} =$

11. $\frac{1}{16} \times 9\frac{3}{5} =$

12. $\frac{2}{5} \times 7\frac{1}{2} =$

13. $\frac{1}{2} \times 3\frac{1}{7} =$

14. $\frac{2}{9} \times 1\frac{1}{2} =$

In working with fractions you need to do a lot of multiplying and dividing quickly and accurately. Here is a good chance to get some practice with numbers you use often.

Multiply or divide, as indicated. Try to think the work and write just the answers.

	a	b
15.	$2 \times 3 =$ ____	$8 \times 4 =$ ____
16.	$\frac{9}{3} =$ ____	$5 \times 7 =$ ____
17.	$4 \times 6 =$ ____	$10 \div 5 =$ ____
18.	$14 \div 2 =$ ____	$9 \times 3 =$ ____
19.	$7 \times 8 =$ ____	$\frac{16}{4} =$ ____
20.	$18 \div 2 =$ ____	$7 \times 3 =$ ____
21.	$\frac{15}{3} =$ ____	$\frac{15}{5} =$ ____
22.	$6 \times 9 =$ ____	$12 \div 4 =$ ____
23.	$\frac{16}{2} =$ ____	$9 \times 2 =$ ____
24.	$20 \div 4 =$ ____	$18 \div 3 =$ ____

Multiplying by a Mixed Number

A

$$\begin{array}{r} 15 \\ \times\ 3\frac{1}{2} \\ \hline 7\frac{1}{2} \quad (\frac{1}{2} \times 15) \\ 45 \quad (3 \times 15) \\ \hline 52\frac{1}{2} \end{array}$$

B

$3\frac{1}{2} \times 15 = ?$

$\frac{7}{2} \times 15 = \frac{7 \times 15}{2}$

$= \frac{105}{2}$

$= 52\frac{1}{2}$

C

$3\frac{1}{2} \times \frac{2}{3} = ?$

$\frac{7}{2} \times \frac{2}{3} = \frac{14}{6}$

$= 2\frac{2}{6}$

$= 2\frac{1}{3}$

D

$3\frac{1}{2} \times 3\frac{1}{5} = ?$

$\frac{7}{2} \times \frac{16}{5} = \frac{112}{10}$

$= 11\frac{2}{10}$

$= 11\frac{1}{5}$

Side work

$3\frac{1}{2} = \frac{7}{2}$

$3\frac{1}{5} = \frac{16}{5}$

1. In all the boxes, the _____ is a mixed number.

2. Boxes A and B show two ways of multiplying a _____ number by a mixed number. In box ____, the mixed number is not changed before multiplying.

3. In boxes B, C, and D, what has been done to the multiplier, $3\frac{1}{2}$?

_____

4. Which box shows how to multiply

a. a fraction by a mixed number? _____

b. a mixed number by a mixed number?

_____

In problems 5 and 6, you must multiply with the same kinds of numbers used in the boxes. For each problem, write the letter of the box that shows the example you would follow. Then write the multiplication example for the problem. Do not solve yet.

5. Bill travels $\frac{4}{5}$ mi. to school. Ed travels $3\frac{1}{3}$ times as far. Ed travels how many miles?

Box _____. Multiply _____ × _____.

6. Bill and Ed rode for $2\frac{1}{2}$ hr. on their bicycles at an average rate of $9\frac{1}{2}$ mi. an hour. How many miles did they ride?

Box _____. Multiply _____ × _____.

Now solve Ex. 5 and 6 in the boxes below, and draw rings around the answers.

Ex. 5

Ex. 6

Multiply. Give answers in best form.

7. $3\frac{1}{3} \times \frac{6}{7} =$

8. $3\frac{3}{4} \times 1\frac{3}{5} =$

9. $\begin{array}{r} 6 \\ \times\ 2\frac{1}{8} \\ \hline \end{array}$

10. $\begin{array}{r} 10 \\ \times\ 7\frac{1}{2} \\ \hline \end{array}$

11. $\begin{array}{r} 12 \\ \times\ 6\frac{2}{3} \\ \hline \end{array}$

12. $2\frac{2}{3} \times \frac{1}{4} =$

13. $1\frac{2}{3} \times 3\frac{3}{4} =$

14. $3\frac{1}{7} \times 1\frac{1}{2} =$

15. $2\frac{5}{8} \times \frac{4}{9} =$

Cancellation with Fractions

Multiply: $\frac{4}{9} \times 1\frac{1}{2}$

Long way: $\frac{4}{9} \times \frac{3}{2} = \frac{4 \times 3}{9 \times 2} = \frac{12}{18} = \frac{2}{3}$

Short way: $\overset{2}{\cancel{4}}/\overset{3}{\cancel{9}} \times \overset{1}{\cancel{3}}/\overset{1}{\cancel{2}} = \frac{2}{3}$

1. In the long way in the box above, the product $\frac{12}{18}$ is reduced to lowest terms by dividing both numerator and denominator by ____.

When we divide both the numerator and the denominator of a fraction by the same number, are we changing the value of the fraction?

_____

2. Study the short way in the box. Often we can make our work shorter by dividing both a numerator and a denominator by the same number before multiplying the fractions.

We divide both the 4 and the 2 by _____, and we divide both the 3 and the ____ by _____.

3. The product of the numbers 2 and 3, by which we divided in Ex. 2, is _____.

The number by which we divide in reducing $\frac{12}{18}$ to lowest terms is ____.

4. Show how you could reduce $\frac{12}{18}$ in two steps. Divide both terms first by 2, and then by 3.

$\frac{12}{18}$ = _____

Cancellation saves work and time, and most people think it is fun, too. But be sure to divide both a numerator and a denominator by the *same* number. That's part of the Golden Rule of Fractions!

Multiply. Use cancellation when it is possible. Test products mentally.

	a	b
5.	$\frac{2}{3} \times \frac{3}{4} =$ ____	$\frac{7}{10} \times \frac{5}{8} =$ ____
6.	$\frac{4}{5} \times \frac{5}{6} =$ ____	$\frac{3}{16} \times \frac{8}{9} =$ ____
7.	$\frac{1}{3} \times \frac{6}{7} =$ ____	$\frac{1}{2} \times \frac{7}{8} =$ ____
8.	$\frac{3}{4} \times \frac{8}{9} =$ ____	$\frac{8}{15} \times \frac{5}{6} =$ ____
9.	$\frac{5}{6} \times \frac{1}{2} =$ ____	$\frac{3}{5} \times \frac{1}{2} =$ ____
10.	$\frac{3}{8} \times \frac{4}{5} =$ ____	$\frac{5}{6} \times \frac{9}{10} =$ ____
11.	$\frac{7}{9} \times \frac{3}{7} =$ ____	$\frac{1}{4} \times \frac{2}{5} =$ ____
12.	$\frac{3}{4} \times \frac{1}{2} =$ ____	$\frac{3}{10} \times \frac{10}{21} =$ ____
13.	$\frac{9}{10} \times \frac{5}{7} =$ ____	$\frac{9}{16} \times \frac{2}{3} =$ ____
14.	$\frac{5}{6} \times \frac{2}{3} =$ ____	$\frac{3}{8} \times \frac{14}{15} =$ ____
15.	$\frac{7}{12} \times \frac{9}{14} =$ ____	$\frac{1}{8} \times \frac{2}{3} =$ ____
16.	$\frac{1}{2} \times \frac{4}{5} =$ ____	$\frac{5}{7} \times \frac{4}{5} =$ ____
17.	$\frac{2}{5} \times \frac{1}{3} =$ ____	$\frac{1}{10} \times \frac{5}{12} =$ ____
18.	$\frac{3}{4} \times \frac{7}{15} =$ ____	$\frac{1}{2} \times \frac{1}{3} =$ ____

Cancellation with More than Two Numbers

Boxes A and B show examples in which more than two fractions, mixed numbers, and whole numbers are multiplied together.

In examples of this kind, you must change any mixed number to an improper fraction. It is not necessary to change a whole number to a fraction, but it is a good idea to do so, to avoid mistakes in cancellation.

A

$\frac{5}{6} \times \frac{4}{5} \times 2\frac{1}{3} = ?$

$\frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{6}}} \times \frac{\overset{2}{\cancel{4}}}{\underset{1}{\cancel{5}}} \times \frac{7}{3} = \frac{2 \times 7}{3 \times 3} = \frac{14}{9} = 1\frac{5}{9}$

B

$9 \times \frac{2}{3} \times 3\frac{1}{5} \times \frac{5}{8} = ?$

$\frac{\overset{3}{\cancel{9}}}{\underset{1}{1}} \times \frac{2}{\underset{1}{\cancel{3}}} \times \frac{\overset{2}{\cancel{16}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{8}}} = 12$

1. In box A, the mixed number _____ is changed to the equal fraction _____.

2. In box B, the 9 is changed to _____.

3. In box B, the $3\frac{1}{5}$ is changed to _____.

4. The cancellation in box B shows that w divided by what numbers? _____

Multiply. Use cancellation when possible. Give your answers in best form.

5. $\frac{5}{6} \times \frac{3}{4} \times \frac{2}{5} =$

6. $\frac{2}{3} \times \frac{21}{32} \times \frac{8}{9} =$

7. $\frac{9}{10} \times \frac{1}{2} \times \frac{2}{3} \times \frac{5}{8} =$

8. $\frac{3}{4} \times \frac{6}{7} \times \frac{5}{6} \times \frac{8}{15} =$

9. $\frac{3}{10} \times \frac{1}{2} \times \frac{5}{9} \times \frac{3}{4} =$

10. $8 \times \frac{3}{16} \times \frac{4}{9} =$

11. $2\frac{1}{2} \times 10 \times \frac{3}{5} =$

12. $9 \times \frac{5}{12} \times \frac{14}{15} =$

13. $18 \times \frac{2}{3} \times \frac{2}{3} \times \frac{1}{2} =$

14. $\frac{3}{5} \times 25 \times \frac{1}{4} \times 1\frac{1}{2} =$

---

15. Tony wanted to write 6 examples in a column on his paper. If he needed $1\frac{1}{4}$ in. of space for each example, how high would the column be?

Space for work

_____

Testing a Product

[*Size of product related to size of multiplier*]

You can test a product easily by noticing whether the multiplier is more or less than 1. Study Ex. a–c in the box below.

a. $4 \times \frac{1}{3} = \frac{4}{3} = 1\frac{1}{3}$
b. $\frac{1}{2} \times \frac{7}{8} = \frac{7}{16}$
c. $1 \times 2\frac{1}{2} = 2\frac{1}{2}$

1. In Ex. a, the multiplier, 4, is _____ (*more; less*) than 1. The product, _____, is _____ (*more; less*) than the multiplicand, _____.

2. In Ex. b, the multiplier, _____, is _____ than 1. The product, _____, is _____ than the multiplicand, _____.

3. In Ex. c, the multiplier is 1. The product is the same as the _____.

If the multiplier is less than 1, the product will be less than the multiplicand.

If the multiplier is more than 1, the product will be more than the multiplicand.

Finish Ex. 5–10 below. Work as in Ex. 4.

		Compare Multiplier with 1	Compare Product with Multiplicand
4.	$\frac{3}{7} \times 7$	$\frac{3}{7}$ is *less* than 1.	Product will be *less* than *7*.
5.	$3 \times \frac{1}{3}$	_____ is _____ than 1.	Product will be _____ than _____.
6.	$\frac{3}{4} \times \frac{1}{4}$	_____ is _____ than 1.	Product will be _____ than _____.
7.	$2\frac{1}{6} \times 1$	_____ is _____ than 1.	Product will be _____ than _____.
8.	$\frac{2}{5} \times 2$	_____ is _____ than 1.	Product will be _____ than _____.
9.	$1 \times \frac{5}{16}$	_____	Product will be _____.
10.	$1\frac{1}{2} \times 1\frac{1}{2}$	_____ is _____ than 1.	Product will be _____ than _____.

Now find products for Ex. 4–10, and write your answers below.

Ex. 4 _____ Ex. 5 _____ Ex. 6 _____ Ex. 7 _____ Ex. 8 _____ Ex. 9 _____ Ex. 10 _____

Multiply in Ex. 11–18. Test the products in the way explained above.

11. $\frac{2}{3} \times 3\frac{1}{8} =$

12. $4 \times \frac{5}{6} =$

13. $1\frac{1}{3} \times 2\frac{1}{4} =$

14. $\frac{5}{16} \times 3\frac{1}{5} =$

15. $1\frac{1}{5} \times \frac{5}{12} =$

16. $\frac{7}{8} \times \frac{2}{7} =$

17. $4\frac{1}{2} \times 5\frac{1}{3} =$

18. $\frac{3}{5} \times 2\frac{1}{3} =$

Do you remember this rule?

To round a mixed number to the nearest whole number: (a) if the fraction is equal to or greater than $\frac{1}{2}$, add 1 to the whole number and drop the fraction; (b) if the fraction is less than $\frac{1}{2}$, drop it.

See how the numbers below are rounded.

$1\frac{7}{8}$ becomes 2. $2\frac{3}{8}$ becomes 2.
$2\frac{1}{2}$ becomes 3. $2\frac{5}{8}$ becomes 3.
$3\frac{1}{4}$ becomes 3.

In Ex. 1–10 below, round each mixed number to the nearest whole number.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Mixed number	$10\frac{1}{4}$	$9\frac{3}{4}$	$4\frac{5}{16}$	$6\frac{7}{12}$	$8\frac{1}{2}$	$3\frac{3}{10}$	$7\frac{15}{16}$	$5\frac{3}{7}$	$4\frac{15}{32}$	$2\frac{2}{3}$
Rounded number . . .										

You have to know when to use the rule above and when to estimate differently. Sometimes it is better *not* to follow the rule! Let's see if you have good judgment.

11. Sue said, "We live about 3 mi. from town." The exact distance is $2\frac{9}{10}$ mi. Was Sue's estimate a good one?

---

12. Dee's father measured a boundary line and found it to be $1{,}316\frac{9}{10}$ ft. Dee asked, "Would you call it 1,317 ft.?"

"Yes," her father said. "A legal description might be '1,317 ft. more or less'; but for some purposes I might round $1{,}316\frac{9}{10}$ ft. either to 1,300 ft. or to $\frac{1}{4}$ mi."

Explain. ---

---

13. Don's father said, "Cut me six pieces of molding $21\frac{1}{4}$ inches long." Should Don round $21\frac{1}{4}$ in. to the nearest inch? Explain.

---

14. Bill made this estimate for $2\frac{9}{10} \times 8\frac{1}{8}$:
"$2 \times 8 = 16$, and $3 \times 9 = 27$, so the answer lies between 16 and 27."

a. Explain Bill's estimate. ---

---

b. The exact answer is ---. Does this agree with Bill's estimate? ---

15. Betsy needed $25\frac{1}{2}$ in. of ribbon for a hat band. She bought $\frac{3}{4}$ yd. Did Betsy make a reasonable estimate?

Explain. ---

---

16. The telephone "Time Service" gave the correct time as "8:47 and 50 seconds."

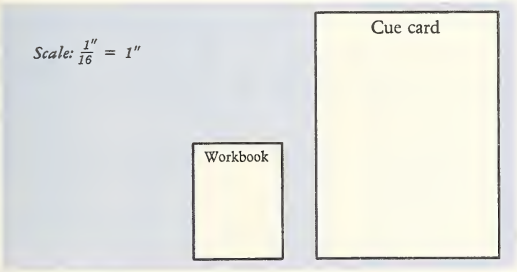
a. Mrs. Huey set her clock at quarter of 9. Was the clock fast or slow then? ---

b. To the nearest minute, the correct time was --- minutes before ---.

Scale Drawing and Television

Sometimes TV actors read their "lines" from cue cards, which are not seen on the TV screen. These cards are rectangles of cardboard with words in large print.

The diagram below shows a cue card and this workbook drawn to the same scale.



1. The scale tells that ____ in. on the drawing represents ____ in. on the cue card. Then 1 in. on the drawing represents ____ in. on the card.

2. The width of the cue card in the drawing is $\frac{1}{16}$ of the width of the actual card; so width of card = ____ × width of drawing.

3. Find the dimensions of the card.

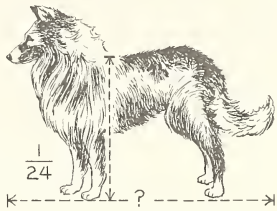
	Drawing	Card
Width:	____ in.	____ in.
Height:	____ in.	____ in.

4. By thinking how many workbooks can fit on one card, you can estimate that the card is about how many times as large as the workbook?

_____

[*Meaning of scale*]

After Ed saw a dog show on TV, he looked up "Collie" in his dictionary. He found a picture that looked like this.



Rough-haired Collie

5. The scale is ____.

6. To find about how long the collie is, you _____ the length of the drawing by _____.

7. The length of the drawing is _____ in. So the real collie is about _____ in., or _____ ft., long.

8. The height of dogs is measured from the withers (shoulders) in a straight line to the ground, as shown by the dashed line in the drawing.

The height in the drawing is _____ inch, so the real collie's height is about _____ in., or _____ ft.

Scale models can sometimes be used in settings for moving pictures and TV productions. Skillful use of the camera makes them appear to be full size.

9. One scene in a film shown on TV represented an earthquake. The buildings were models to the scale *1 ft. = 12 ft.* Find the width and height of the model representing a house 34 ft. wide and 20 ft. high.

Width: _____ Height: _____

10. The model of a factory building was $8\frac{3}{4}$ ft. long. How long was the real building that it represented? (Use the scale in Ex. 9.)

_____

11. A church steeple 88 ft. high was how high in the scale model?

_____

Making and Reading Scale Drawings

1. Make three scale drawings of a line that is 8 in. long. Use these scales:

Scale, $\frac{1}{4}$.

Scale, $\frac{1}{16}$.

Scale, $\frac{1}{8}$.

2. In Ex. 1, which of the scales made the largest drawing? _____ the smallest drawing? _____ The larger the scale is, the _____ the scale drawing is.

3. If you draw a picture of a bird to the scale $\frac{1}{4}$, and then draw a picture of the same bird to the scale $\frac{1}{2}$, will the first drawing be larger or smaller than the second drawing?

_____

4. If you want to show a 10-inch line on a drawing to the scale *1 in. = 4 in.*, you *think*, "My line must be as many inches long as there are 4's in 10, or _____ inches."

5. To the scale *1 in. = 4 in.*, a line 6 feet long would be _____ in. long in the drawing. Explain. _____

_____

6. Last summer, at his grandfather's farm, Richard collected snakes. Finish the list of lengths below. Then draw lines to represent these lengths. Use the scale *1 in. = 16 in.*

a. Striped adder, $2\frac{1}{2}$ ft., or _____ in.

b. Garter snake, $1\frac{1}{2}$ ft., or _____ in.

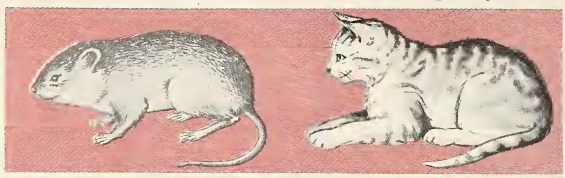
c. Black snake, $3\frac{3}{4}$ ft., or _____ in.

a.

b.

c.

[*Using a scale*]



Mouse ($\frac{1}{2}$) Cat ($\frac{1}{12}$)

7. If you had never seen either a cat or a mouse, how could you tell from these drawings which animal is larger?

The real mouse is ____ times as large as the drawing; the real cat is ____ times as large.

8. This could be a picture of Susan's doll's teacup or of Susan's mother's cup, depending on the _____ of the drawing.

Is it a doll's cup if the scale is $\frac{1}{2}$? _____ if the scale is $\frac{1}{6}$? _____

9. Scale drawings are not always smaller than the things which they represent. Look at the drawing of a mosquito, at the right. Is it larger or smaller than life size?

Scale: $\frac{2}{1}$

_____

10. The mosquito was drawn to what scale? ____ You know that a scale of $\frac{1}{2}$ means that 1″ in the drawing stands for ____″ in the real object. Then a scale of $\frac{2}{1}$ means that 2″ in the drawing stand for ____″ in the real object.

11. In the drawing the wingspread of the mosquito is ____″. The wingspread of the real mosquito is $\frac{1}{2}$ of $\frac{3}{4}$″, or ____″.

Making and Reading Graphs

[*Picture graph and bar graph*]

1. Uncle Pete gave Joe some out-of-print United States stamps for his collection. Joe made a record when he sorted the stamps.

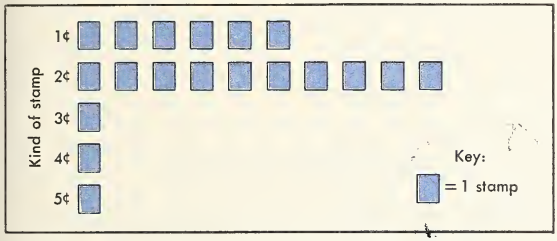
a. In this record, / means ____ stamp.

b. Complete the table.

Stamps	1¢	2¢	3¢	4¢	5¢
Tally	///// /	///// /////	///// ///	//	/////
Number	6				

Total number of stamps: _____

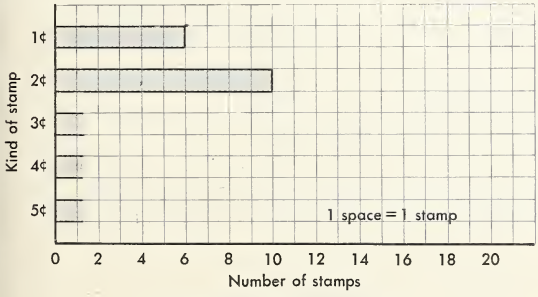
2. Uncle Pete showed Joe how to draw a **picture graph**. Finish this graph:



Joe's Stamps from Uncle Pete

3. The **key** of the graph shows that each picture stamp stands for ____ stamp.

Joe thought that a picture graph is easy to read, but it takes a lot of time to draw. So Uncle Pete made this **bar graph:**



Joe's Stamps from Uncle Pete

4. The graph above is called a **horizontal-bar graph** because _____

_____.

5. Finish the horizontal-bar graph.

6. Joe thought that this bar graph is something like the picture graph. See if you can tell why Joe thought so.

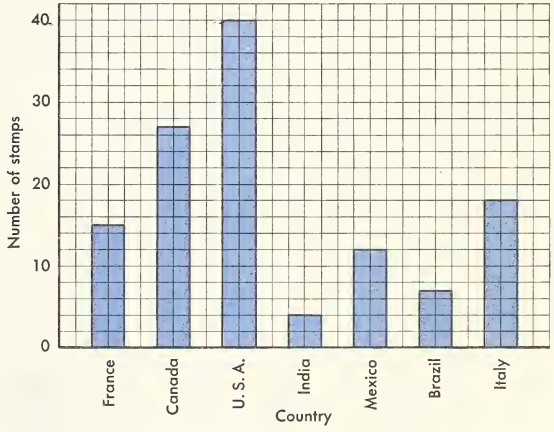
_____

_____

_____

_____

To show how many stamps he has from different countries, Joe made the **vertical-bar graph** below.



Joe's Stamps from Different Countries

7. In Joe's graph, each small space on the number scale represents _____ stamps. Why didn't Joe number all the dividing lines?

_____

8. Find how many stamps Joe has from each country. Write the number after the name of the country in the list below.

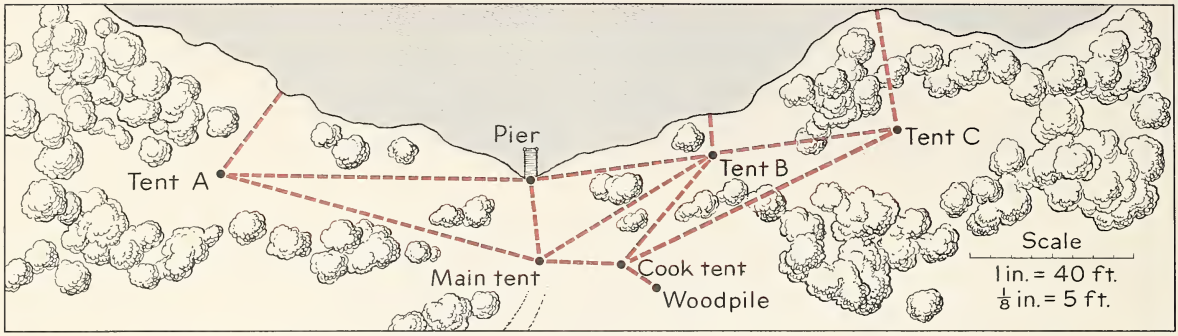
France _____ India _____

Canada _____ Mexico _____

U.S.A. _____ Brazil _____

Italy _____

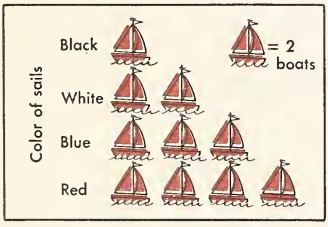
Reading Maps and Graphs



1. The picture above is a scale drawing, or map, of Lakeside Camp. Measure from center to center of the dots on the map to find the distances listed below. Then use the scale to find the real distances.

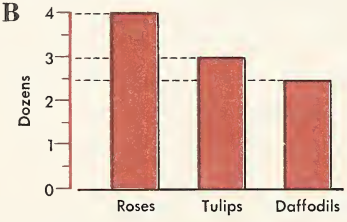
	Distance	
	Map	Real
a. Main tent to pier	_____	_____
b. Cook tent to main tent	_____	_____
c. Woodpile to cook tent	_____	_____
d. Tent A to pier	_____	_____
e. Tent A to shore	_____	_____
f. Tent A to main tent	_____	_____
g. Tent B to pier	_____	_____
h. Tent B to main tent	_____	_____
i. Tent B to shore	_____	_____
j. Tent B to Tent C	_____	_____
k. Tent B to cook tent	_____	_____
l. Tent C to shore	_____	_____
m. Tent C to cook tent	_____	_____

A



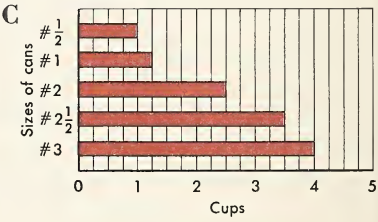
Sailboats in the Race

B



Flowers Sold on Monday

C



Contents of Standard Cans

2. Graph A is a _____ graph. Each picture of a boat means ____ sailboats.

3. How many boats had

a. red sails? _____

b. blue sails? _____

c. black sails? _____

d. white sails? _____

4. Graph B is a vertical-_____ graph.

5. On the scale, 0, 1, 2, 3, and 4 mean _____.

6. Each small space on the scale stands for what fraction of a dozen? _____

7. How many daffodils were sold? _____

8. Graph C shows that a #3 can holds _____ cups.

9. Each small space on the scale stands for ____ cup.

10. A #2 can contains _____ cups.

Drawing Graphs

[*Picture graph and bar graph*]

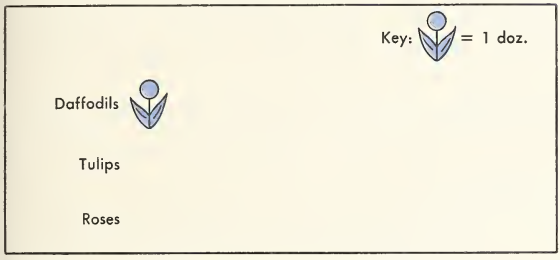
On page 84, a vertical-bar graph was used to show the facts in the table below.

The same facts can be shown also in a picture graph or a horizontal-bar graph.

Flowers Sold on Monday	
Daffodils	$2\frac{1}{2}$ doz.
Tulips	3 doz.
Roses	4 doz.

1. In the picture graph below, the key says that  stands for 1 doz. flowers. Then  can be used to stand for ____ doz. flowers.

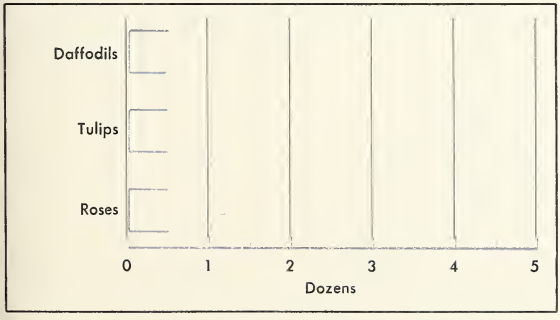
2. Finish this picture graph:



Flowers Sold on Monday

3. In the horizontal-bar graph that has been started below, each small space on the number scale represents _____ dozen flowers.

4. Finish the bar graph below. Use the number scale to help you make each bar the correct length.



Flowers Sold on Monday

5. In Ex. 2, the number of tulip pictures is ____ of the rose pictures. Are 3 dozen $\frac{3}{4}$ as many as 4 dozen? _____

6. In your bar graph (Ex. 4), the tulips' bar is _____ as long as the bar for roses.

7. Suppose you made the bar graph to any other scale, what would be the relation between the bar for tulips and the bar for roses?

_____

_____

8. On the squared paper below, draw a graph for each set of facts below.

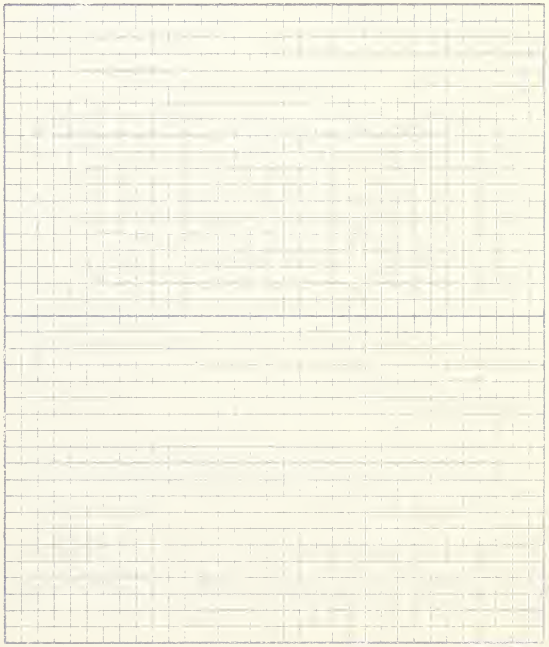
Make one a picture graph and the other a bar graph. Show the scale or key. Label the bars or rows of pictures, and give each graph a title. A graph should show all the facts in the table.

a. Eggs Laid by Ed's Hens Last Week

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
10	12	14	10	13	15	9

b. Fish Caught on Saturday

Bill	Tom	Ed	Sam	Joe
3	5	2	2	4



Add? Subtract? Multiply? Divide?

For each missing word, write "add" or "subtract" or "multiply" or "divide," whichever makes the statement true.

Then write and work an example (or two examples if necessary) to illustrate each statement. It may help if you think of an example before you complete the statement. Draw a diagram when you think that one is needed. Number each example like its statement.

Illustrations

1. To change an improper fraction to a whole number or a mixed number, you _____ the numerator by the denominator.

2. To find the area of a rectangle, you think of the number of area units in one row along the long side; then you _____ this number by the number of rows.

3. To find how many there are in one of the equal parts of a group, you _____.

4. To change from larger units of measure to smaller units, you _____.

5. You cannot _____ or _____ fractions unless they have a common denominator.

6. To change from smaller units of measure to larger units, you _____.

7. You can _____ or _____ both terms of a fraction by the same number without changing the value of the fraction.

8. To find a difference or a remainder, _____.

9. To find a total, either _____ or _____.

10. To find how many equal small groups are contained in a larger group, you _____.

Do You Remember?

[Review: Scale drawing and graphs]

1. Suppose this is a scale drawing of your shoe. Measure the length of the drawing; then measure your shoe to the nearest inch. Find the scale of the drawing.

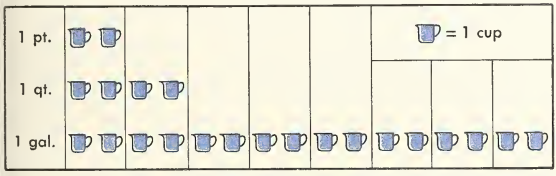
Length of drawing: _____ in.

Length of your shoe: About _____ in.

Scale of drawing: About 1 in. = _____ in.

2. On a map to the scale *1 in. = 50 mi.*, a line $2\frac{7}{10}$ in. long represents _____ mi.

3. In a drawing to the scale $\frac{4}{1}$, a line 7 in. long represents _____ in. on the real object.



Liquid Measures

4. From the graph above, supply the numbers missing in these tables:

a	b
1 pt. = _____ cups	1 qt. = _____ pt.
1 qt. = _____ cups	1 gal. = _____ qt.
1 gal. = _____ cups	1 gal. = _____ pt.

5. For each fact in Table _____, you can just count the pictures in one row of the graph. For each fact in Table _____, you compare the totals for two rows.

6. Draw a horizontal-bar graph below to show the facts in Table a, Ex. 4.

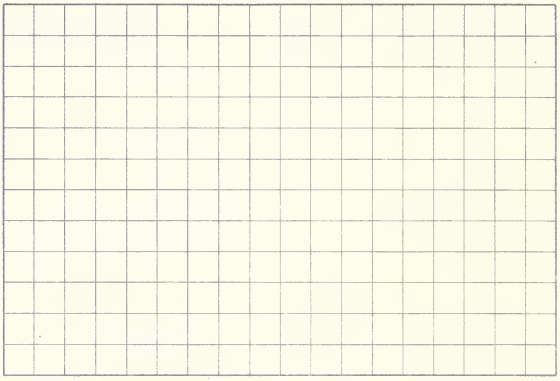
To help you choose the scale, *think*:

a. The longest bar in the graph will stand for how many cups?

_____

b. There are _____ squares across the paper from left to right. Then can you let one small space on your number scale stand for 1 cup?

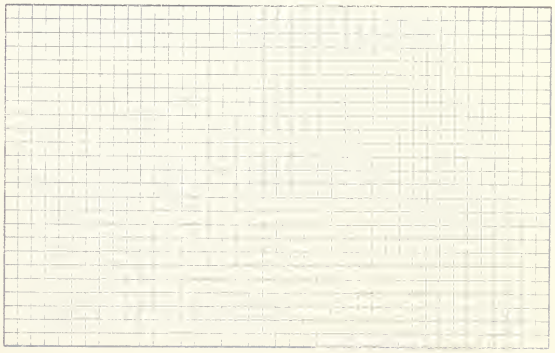
_____



7. On the squared paper below, draw a vertical-bar graph to show these heights:

Father,	5 ft. 9 in.	Tommy,	4 ft. 9 in.
Mother,	5 ft. 6 in.	Sally,	3 ft. 6 in.
Bill,	5 ft. 3 in.	Dicky,	2 ft.

HELPER. Let 1 square = 3 in., and mark only each foot on the scale. Make the bars 2 squares wide and 2 squares apart. To label each bar, write the person's name on it. Don't forget to give the graph a title!



Testing What You Have Learned

[*Cumulative Review*]

1. Round to the nearest whole number:

a. $6\frac{2}{3}$ _____ **c.** $2\frac{1}{2}$ _____ **e.** $1\frac{7}{12}$ _____

b. $8\frac{1}{4}$ _____ **d.** $\frac{7}{8}$ _____ **f.** $1\frac{7}{16}$ _____

2. a. $\frac{11}{12} \times 32 =$ _____

b. $2\frac{4}{5} \times 3\frac{1}{7} =$ _____

3. At 50¢ a pound, how much does $1\frac{1}{2}$ lb. of ground meat cost? _____

4. To the scale $\frac{1}{2}$ *in.* = *1 ft.*, how long is the line that shows 15 ft.? _____

5. Round to the nearest hundred:

a. 5,280 _____ **c.** 43,560 _____

b. 144 _____ **d.** 1,092 _____

6. Change these measures as directed:

a. $3\frac{1}{2}$ ft. = _____ in. **d.** 2 lb. = _____ oz.

b. $1\frac{1}{4}$ bu. = _____ pk. **e.** 18 in. = _____ ft.

c. 5 pt. = _____ qt. **f.** 45 in. = _____ yd.

7. In the example $\frac{3}{4} \times 8 = 6$, the product is _____, the multiplier is _____, the multiplicand is _____, and the factors of the product are _____ and _____.

8. Show how to tell which fraction is larger, $\frac{2}{3}$ or $\frac{3}{4}$.

_____

9. Draw a ring around the larger fraction in each pair below.

a. $\frac{1}{2}$ $\frac{11}{16}$ **d.** $\frac{3}{4}$ $\frac{7}{10}$

b. $\frac{1}{8}$ $\frac{1}{6}$ **e.** $\frac{5}{8}$ $\frac{2}{3}$

c. $\frac{3}{4}$ $\frac{3}{5}$ **f.** $\frac{7}{12}$ $\frac{5}{8}$

10. Turtles sometimes live to be very old. A turtle that was first seen on the island of Mauritius in 1766 was accidentally killed in 1918. About how many years did it live?

_____

11. The sign on a bargain counter said:

REMNANTS — About 1 yd. each

The measurements of 5 remnants on the counter are given in the box.

Inches
39
36
40
38
37

a. The average length was _____ in.

b. Was the sign correct? _____

c. There are ____ remnants longer than the average, ____ shorter, and ____ just the average length.

d. On the average, were the remnants more or less than a yard long? _____

12. A "disc jockey" invited three judges to score some new records. For each record, each of the judges put down a score between 75 points ("fair") and 100 points ("wonderful"). One record got scores of 79, 81, and 86 points. What was its average score?

_____

13. Do what the signs tell you.

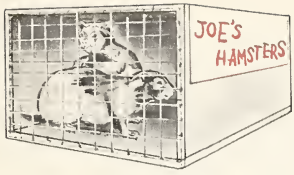
a. $\frac{3}{4} + \frac{2}{3} =$ _____

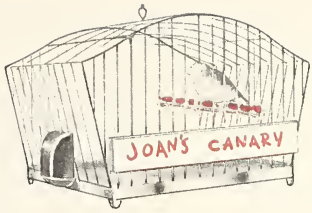
b. $\frac{3}{4} \times \frac{2}{3} =$ _____

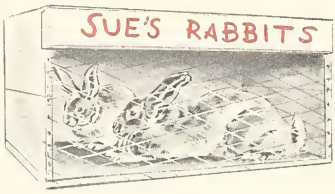
c. $\frac{3}{4} - \frac{2}{3} =$ _____

d. $1\frac{2}{3} - \frac{3}{4} =$ _____

5







The School Zoo

[*Dividing a whole number by a fraction*]

The following 6th-grade pupils lent their pets to the School Zoo for a week:

Joe . . . hamsters	Joan . . . . canary
Jim . . . mice	Sue . . . . rabbits

The children made up problems 1–6.

For each problem, **a.** find, in the boxes below, a diagram and a solution that fit and mark each of them with the example number; **b.** write the answer after the problem. Be sure to label the answer (ounces, days, teaspoons, and so on) to show what it means.

1. Joe feeds $\frac{1}{2}$ ounce of pellets a day to each hamster. How much do his 3 hamsters eat in a week?

Ans. _____

2. In Ex. 1, how soon will a hamster eat 1 lb. of food?

Ans. _____

3. Joe gives the mother hamster $\frac{1}{4}$ cup of milk a day. How long will 1 cup of milk last?

Ans. _____

4. For the frame for his mouse cage, Jim cut a board 6 in. wide into $\frac{3}{4}$-inch strips. How many strips did he get from the board?

Ans. _____

5. When one of her rabbits was sick, Sue put $\frac{1}{4}$ tsp. of medicine in the milk twice a day. How much medicine did the rabbit have in 3 days?

Ans. _____

6. Joan gives her canary a heaping teaspoonful of bird seed a day. If that is about $\frac{2}{3}$ tbsp., how long will 6 tbsp. of bird seed last?

Ans. _____

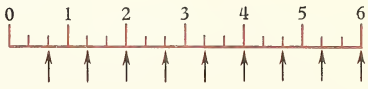
Ex. ____ $2 \times \frac{1}{4} = \frac{1}{2}$
$3 \times \frac{1}{2} = 1\frac{1}{2}$

Ex. ____ $3 \times \frac{1}{2} = 1\frac{1}{2}$
$7 \times 1\frac{1}{2} = 10\frac{1}{2}$

Ex. ____ 

Ex. ____ 

Ex. ____ 

Ex. ____ 

Ex. ____ $1 \div \frac{1}{4} = 4$ fourths $\div$ 1 fourth $= 4$

Ex. ____ $16 \div \frac{1}{2} = \frac{32}{2} \div \frac{1}{2} = 32 \div 1 = 32$

Ex. ____ $6 \div \frac{3}{4} = \frac{24}{4} \div \frac{3}{4} = 24 \div 3 = 8$

Ex. ____ $6 \div \frac{2}{3} = \frac{18}{3} \div \frac{2}{3} = 18 \div 2 = 9$

Ex. ____ 

Ex. ____ 

Dividing by a Fraction

[*Dividend a whole number*]

A

$4 \div \frac{2}{3} = ?$

B

$$4 \div \frac{2}{3} = \frac{12}{3} \div \frac{2}{3} = 12 \div 2 = 6$$

1. The entire number line (box A) shows ____ ones, each divided into ____ equal parts; that is, the line shows ____ thirds in all.

2. When we mark off distances of $\frac{2}{3}$ on the number line in box A, we are measuring $\frac{12}{3}$ by $\frac{2}{3}$, or dividing 4 by ____.

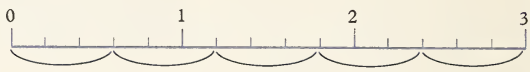
3. The diagram shows that $\frac{2}{3}$ is contained exactly ____ times in 4.

4. In the diagram and in the number work (box B), the dividend, ____, is changed to an equal fraction with the fractional unit ____, so that both dividend and divisor will have a _____ denominator.

5. Box B shows that in $\frac{12}{3}$ there are as many groups of $\frac{2}{3}$ as there are 2's in ____.

6. To divide 9 by $\frac{6}{7}$, you first change the 9 to $\frac{\quad}{7}$. Then you divide _____ by _____.

7. **a.** Write the division example shown by the diagram below: ____ ÷ ____ = ____



b. Now do the division with figures.

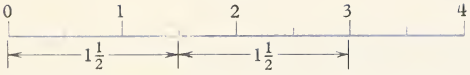
8. Mark this line to show $4 \div \frac{1}{2}$.

Dividing by a Mixed Number

[*Dividend a whole number*]

A

$4 \div 1\frac{1}{2} = ?$



1. Box A. Why is each 1 divided into $\frac{1}{2}$'s?

_____

_____

2. After $1\frac{1}{2}$ is measured twice along the line in box A, the distance remaining is how many halves?

_____

B

$$4 \div 1\tfrac{1}{2} = \frac{8}{2} \div \frac{3}{2} = 8 \div 3, \text{ or } \frac{8}{3}, \text{ or } 2\tfrac{2}{3}$$

3. In box A, the remainder, 2 halves, is what fractional part of the divisor, 3 halves?

_____

So the distance remaining is _____ of the distance needed to measure another $\frac{3}{2}$.

4. In box B, what did we do to both dividend and divisor before we divided?

_____

Finding Mistakes

[Dividing whole number by fraction or mixed number]

Many of these answers are wrong. Cross out a wrong answer like this: X. Then divide correctly and check (✓) the correct answer.

1. $8 \div \frac{4}{9} = \frac{72}{9} \div \frac{4}{9} = 72 \div 4 = 18$

2. $6 \div \frac{2}{3} = \frac{6}{3} \div \frac{2}{3} = 6 \div 2 = 3$

3. $4 \div \frac{4}{9} = \frac{36}{9} \div \frac{4}{9} = 36 \div 4 = 9$

4. $3 \div 1\frac{1}{2} = \frac{3}{2} \div \frac{3}{2} = 3 \div 3 = 1$

5. $7 \div \frac{3}{7} = \frac{7 \times 3}{7} = \frac{21}{7} = 3$

6. $2 \div \frac{1}{2} = 4$ halves $\div$ 1 half $= 4$

7. $5 \div \frac{2}{3} = \frac{10}{2} \div \frac{2}{3} = \frac{10}{3} = 3\frac{1}{3}$

8. $6 \div \frac{3}{7} = \frac{42}{7} \div \frac{3}{7} = 42 \div 3 = 14$

9. $15 \div 3\frac{3}{4} = \frac{60}{4} \div \frac{15}{4} = 60 \div 15 = 4$

10. $17 \div 3\frac{1}{2} = \frac{34}{2} \div \frac{7}{2} = 34 \div 7 = 4\frac{2}{7}$

11. $4 \div \frac{3}{8} = 4 \times \frac{3}{8} = \frac{12}{8} = \frac{3}{2} = 1\frac{1}{2}$

12. $10 \div \frac{5}{6} = \frac{60}{6} \div \frac{5}{6} = 60 \div 5 = 12$

13. $10 \div 1\frac{7}{8} = \frac{80}{8} \div \frac{15}{8} = 80 \div 15 = 5\frac{1}{3}$

14. $6 \div \frac{5}{9} = \frac{54}{9} \div \frac{5}{9} = 54 \div 5 = 10\frac{4}{5}$

15. $14 \div \frac{7}{8} = \frac{112}{8} \div \frac{7}{8} = 112 \div 7 = 17$

16. $5 \div 1\frac{1}{3} = \frac{5}{3} \div \frac{4}{3} = \frac{20}{9} = 2\frac{2}{9}$

17. $8 \div 2\frac{2}{3} = \frac{16}{3} \div \frac{8}{3} = 16 \div 8 = 2$

18. $12 \div \frac{3}{4} = 12 \div 4 = 3$

19. $6 \div 2\frac{1}{4} = \frac{24}{4} \div \frac{9}{4} = 24 \div 9 = 2\frac{2}{3}$

20. $1 \div \frac{1}{5} = \frac{2}{5}$

21. $14 \div \frac{5}{7} = \frac{98}{7} \div \frac{5}{7} = 98 \div 5 = 19\frac{3}{5}$

All these puzzles are about fractions. Think carefully and do not let them fool you.

1. A watermelon weighs $\frac{4}{5}$ pound more than $\frac{4}{5}$ of its weight in pounds. How many pounds does it weigh?

---

2. If $1\frac{1}{2}$ candies cost $1\frac{1}{2}¢$, how much will $1\frac{1}{2}$ doz. cost?

---

3. If a peach weighs $\frac{7}{8}$ of an ounce more than a plum that weighs $\frac{7}{8}$ of an ounce, how much does the peach weigh?

---

4. What is the number that becomes 20 when multiplied by 40?

---

5. A boat was floating in water 23 ft. deep. The water came $\frac{1}{3}$ of the way up the side of the boat. Then the tide rose 2 feet. How far up the side of the boat did the water come then?

---

6. After $\frac{1}{10}$ of a piece of cloth was cut off, there were 10 yd. left in the piece. How many yards were there at first?

Dividing by a Fraction or a Mixed Number

[*Dividend a whole number*]

1. **a.** $6 \div \frac{3}{5} = ?$ At the foot of the page, draw a long line and label it A. Mark line A to show $6 \div \frac{3}{5}$.

HELPER. You are working with fifths, so the line should show 6×5, or 30, equal parts. You will have room enough to make each of these parts $\frac{1}{4}$ inch long.

b. $6 \div \frac{3}{5} = \frac{\quad}{5} \div \frac{3}{5} = \_\_\_ \div \_\_\_ = \_\_\_$

2. Ex. 1 shows that, to divide a whole number by a fraction, you change the _____ number to a _____ which has the same _____ as the divisor. Then _____, using just the numerators.

3. **a.** $6 \div 1\frac{1}{5} = ?$ Below line A, draw another number line and label it B. Mark line B to show $6 \div 1\frac{1}{5}$.

b. $6 \div 1\frac{1}{5} = \frac{\quad}{5} \div \frac{\quad}{5} = \_\_\_ \div \_\_\_ = \_\_\_$

4. Ex. 3 shows that in dividing a whole number by a mixed number you first change both numbers to _____ fractions. Then you work just as you do in dividing a whole number by a _____.

5. To divide a whole number by a fraction or by a mixed number, you express both dividend and divisor as fractions with the same _____.

In the examples below, use either a number line or the common-denominator method, whichever you like better. If you use a number line, be sure you know what any remainder means.

6. $3 \div \frac{1}{2} =$

7. $7 \div \frac{2}{5} =$

8. $7 \div 1\frac{3}{4} =$

9. $5 \div \frac{5}{9} =$

10. $6 \div 1\frac{1}{3} =$

11. $5 \div \frac{3}{10} =$

12. $15 \div \frac{5}{8} =$

13. $10 \div 3\frac{3}{4} =$

14. $8 \div \frac{4}{9} =$

15. $9 \div 2\frac{1}{4} =$

16. $12 \div 2\frac{4}{5} =$

17. $3 \div \frac{2}{9} =$

18. $10 \div \frac{5}{7} =$

19. $2 \div \frac{1}{6} =$

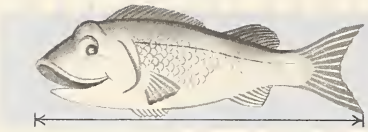
20. $6 \div \frac{3}{7} =$

21. $12 \div \frac{3}{5} =$

22. To check a quotient, you can multiply the _____ and the _____ to see if the product equals the _____.

HELPER. Think of $6 \div 3 = 2$. The product of 3, the divisor, and 2, the _____, equals the dividend, _____.

Check in this way the quotients you found for Ex. 6–21. Work below the examples.



Scale: $\frac{1}{8}$

1. This picture shows the fish that won Bill the prize in the fishing contest.

a. The scale $\frac{1}{8}$ means that 1″ on the drawing represents ____″ on the fish.

b. The drawing is ____″ long.

c. Bill's fish was _____″ long.

2. The scale $\frac{1}{8}$ also means that the drawing is ____ as long as the fish; or, to put it the other way, the fish was ____ times as long as the drawing. The scale in a scale drawing shows a relationship, or ratio.

3. The biggest fish caught were:

Bill's, 16″; Tom's, 12″; Ed's, 8″

Draw lines to the scale $\frac{1}{8}$ to represent the boys' fish.

Bill's:

Tom's:

Ed's:

4. Compare Bill's and Tom's catches:

a. Bill's fish was _____ times as long as Tom's; **b.** Tom's was ____ as long as Bill's.

5. Compare Tom's and Ed's catches:

a. Tom's fish was _____ times as long as Ed's fish; **b.** Ed's fish was _____ as long as Tom's fish.

6. Use ratios to compare Bill's fish with Ed's fish in two ways.

_____

_____

_____

7. Sally said, "I got 8 answers right on a test of 10 questions."

Write these ratios in best form.

a. Ratio of right answers to total: _____

b. Ratio of right answers to wrong: _____

c. Ratio of wrong answers to total: _____

d. Ratio of wrong answers to right: _____

8. Now use these ratios in sentences. Label each sentence with the letter of the ratio that you used from Ex. 7.

(____) Sally got ____ of the answers right.

(____) She got ____ of the answers wrong.

(____) Her answers were right ____ times as often as they were wrong.

(____) She got wrong answers ____ as many times as she got right answers.

9. Did Sally miss 2 questions? _____

Why isn't 2 a ratio here? _____

_____

_____

_____

10. Tom's father is 40 years old, and Tom is 12 years old.

a. Tom's father is _____ times as old as Tom.

b. Tom is ____ as old as his father.

What Does the Quotient Mean?

[*How many times? What part of?*]

1. When we compared Bill's 16-inch fish and Ed's 8-inch fish, we found that

a. Bill's fish was $\frac{16}{8}$, or ____ times, as long as Ed's.

b. Ed's fish was $\frac{8}{16}$, or ____, as long as Bill's.

2. $15 \div 5 =$ ____. This means that 15 is ____ times 5.

3. $5 \div 15 =$ ____. This means that 5 is ____ of 15.

4. $4 \div \frac{2}{3} = \frac{}{3} \div \frac{2}{3} =$ ____ $\div$ ____ = ____. The quotient means that 4 is ____ times $\frac{2}{3}$.

5. $4 \div 2\frac{1}{2} =$ ____. The quotient means that 4 is ____ times $2\frac{1}{2}$.

6. $4 \div 6\frac{2}{3} =$ ____. The quotient means that 4 is ____ of $6\frac{2}{3}$.

You can tell whether the quotient will be a **how-many-times** number or a **what-part-of** number if you notice whether the dividend is larger or smaller than the divisor.

Complete Ex. 7 and 8 by inserting either "larger" or "smaller." Use Ex. 1–6 to help you.

7. The quotient is a how-many-times number (that is, a number ____ than 1) when the dividend is ____ than the divisor.

8. The quotient is a what-part-of number (that is, a number ____ than 1) when the dividend is ____ than the divisor.

Without dividing in rows 9–13, copy each example in the box at the right to show what its quotient will mean.

	a	b	c	d
9.	$25 \div 5$	$3 \div 2$	$12 \div \frac{7}{8}$	$23 \div 6$
10.	$7 \div 28$	$8 \div 9$	$9 \div 27$	$2 \div 3\frac{1}{7}$
11.	$3 \div \frac{1}{2}$	$14 \div \frac{15}{16}$	$8 \div 3$	$15 \div 20$
12.	$10 \div 6\frac{1}{2}$	$7 \div 7\frac{1}{4}$	$14 \div 2\frac{9}{16}$	$19 \div 1\frac{1}{9}$
13.	$\frac{1}{2} \div \frac{7}{8}$	$39 \div 13$	$10 \div 16$	$15 \div 8$

Number Tricks and Puzzles

1. If 6 cats can eat 6 rats in 6 minutes, how many cats will it take to eat 100 rats in 100 minutes at the same rate?

---

2. Joe had 5 sandwiches and Ted had 3. Sam offered to pay 40¢ if he could share their lunch. If they all ate the same amount, and ate all the sandwiches, how should the 40¢ be divided between Joe and Ted?

Joe, _____¢; Ted, _____¢

In Rows 9–13 the Quotient Tells

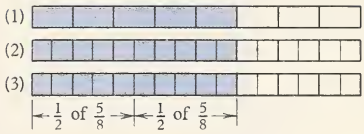
How Many Times	What Part of
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Dividing a Fraction by a Whole Number

[*Inverting the divisor*]

A

Show $\frac{5}{8} \div 2$ by a diagram.



B

Divide $\frac{5}{8}$ by 2.

Think: $\frac{5}{8} \div 2 = \frac{1}{2}$ of $\frac{5}{8}$

$\frac{1}{2}$ of $\frac{5}{8} = \frac{1}{2} \times \frac{5}{8}$, or $\frac{5}{8} \times \frac{1}{2}$

Solution: $\frac{5}{8} \div \frac{2}{1} = \frac{5}{8} \times \frac{1}{2} = \frac{5}{16}$

Complete these statements about box A:

1. Bar (1) shows 5 _____ colored.

2. Bar (2) shows each ____ divided into 2 parts, so each $\frac{1}{2}$ of $\frac{1}{8}$ is ____ of 1.

3. Bar (3) shows that $\frac{1}{2}$ of $\frac{5}{8}$ = _____, because _____

_____.

4. Is the quotient of $\frac{5}{8} \div 2$ greater or less than 1? _____ How could you know this without dividing? _____

_____

_____

5. When you divide any proper fraction by a whole number, the quotient will always be _____ than 1.

Now look at box B.

6. Notice that the divisor, ____, can be written as the improper fraction $\frac{2}{1}$. If $\frac{2}{1}$ is inverted (that is, if numerator and denominator change places), it becomes _____.

7. To divide $\frac{5}{8}$ by 2, you can find $\frac{1}{2}$ of $\frac{5}{8}$, or $\frac{1}{2} \times \frac{5}{8}$, or $\frac{5}{8} \times$ _____.

8. Check the quotient of $\frac{5}{8} \div 2$ by multiplying the divisor and the _____ to see if you get the _____.

_____ × _____ = _____, or _____.

To divide a fraction by a whole number, write the whole-number divisor as a fraction, invert it, and multiply.

Divide. Cancel when you can.

9. $\frac{3}{4} \div 9 =$

10. $\frac{1}{3} \div 6 =$

11. $\frac{2}{5} \div 4 =$

12. $\frac{9}{10} \div 6 =$

13. $\frac{4}{7} \div 8 =$

14. $\frac{7}{8} \div 4 =$

15. $\frac{3}{5} \div 2 =$

16. $\frac{2}{3} \div 3 =$

17. $\frac{5}{6} \div 10 =$

18. $\frac{3}{4} \div 4 =$

19. $\frac{9}{16} \div 6 =$

Dividing a Mixed Number by a Whole Number

[*Quotient: how many times; what part of*]

A

$$1\tfrac{2}{3} \div 6 = \tfrac{5}{3} \times \tfrac{1}{6} = \text{\_\_\_\_\_}$$

1. In box A, the dividend is _____, and the divisor is _____. Will the quotient be a how-many-times number or a what-part-of number? _____

Why? _____

_____

2. In box A, where does the $\frac{5}{3}$ come from?

_____

_____ the $\frac{1}{6}$? _____

_____. Finish the work in box A.

3. The answer in box A shows that $1\frac{2}{3}$ is what part of 6? _____

B

$$3\tfrac{1}{5} \div 2 = \overset{8}{\cancel{16}} \times \tfrac{1}{\cancel{2}_{1}} = \tfrac{8}{5} = \text{\_\_\_\_\_}$$

4. In box B, the quotient will be a _____-_____-_____ number because the dividend is _____ than the divisor.

5. Finish the work in box B.

6. Box B shows that $3\frac{1}{5}$ is _____ times 2.

7. To divide a mixed number by a whole number, you first change the mixed number to an _____ fraction. Then you work just as you do when you divide a _____ by a _____ number.

8. Five boys wanted to divide $4\frac{3}{8}$ pounds of nuts into equal shares. Find each boy's share.

a. In this example, we are dividing $4\frac{3}{8}$ lb. into ____ equal parts. That is, we are finding how many there are in each $\frac{1}{5}$ of _____.

b. Write and work the division example in the space below.

Divide in Ex. 9–16. Use cancellation when you can.

9. $2\frac{1}{4} \div 3 =$

10. $1\frac{1}{2} \div 4 =$

11. $5\frac{1}{3} \div 4 =$

12. $6\frac{3}{4} \div 9 =$

13. $3\frac{2}{3} \div 4 =$

14. $3\frac{3}{5} \div 8 =$

15. $3\frac{6}{7} \div 3 =$

16. $2\frac{3}{4} \div 3 =$

Alice in Wonderland

[*Problems with fractions*]

In a TV production of the story of *Alice in Wonderland*, Alice had to appear very tall after she ate the cake, and very short when she held the White Rabbit's glove.

Since the audience would judge Alice's height by the ratio of her height to the height of the furniture, the effect was accomplished by using special furniture.

1. The actress who played "Alice" was 5 ft. tall. Was she twice as tall as an ordinary table, $2\frac{1}{2}$ ft. high?

---

2. In order to make "Alice" appear very tall, would the special table have to be higher or lower than an ordinary table?

---

3. When the special table was 10 ft. high, "Alice" was still 5 ft. tall. She was only ____ as high as the table. Since the table appeared to be an ordinary table, $2\frac{1}{2}$ ft. high, how tall did Alice then seem to be in the picture?

When Alice grew to be 9 ft. tall after eating the cake, she became confused about arithmetic. You don't need to be confused about solving problems if you remember what you have learned about fractions.

Work the following problems and write the answers on the lines:

4. The Mock Turtle's dance took only $2\frac{1}{4}$ min. on the TV screen, but the actors spent 3 hr. rehearsing it. The rehearsal time was how many times as long as the screen time?

---

5. During the 90-minute TV production, there were 4 commercials, each of which lasted $1\frac{1}{2}$ min. The time used for commercials was what part of the total time?

---

6. Joan and three friends watched *Alice in Wonderland* together. While they watched the program, they ate $\frac{3}{4}$ of a 6-ounce package of nuts. How many ounces was that?

---

7. For supper, after the TV program, Joan made cocoa with evaporated milk. She used $1\frac{5}{8}$ c. of evaporated milk and added $\frac{1}{2}$ that much water. How many tablespoonfuls of water did Joan use? (1 cup = 16 tablespoons)

---

8. During a game, Joan asked, "If $\frac{1}{2}$ mile is marked off into 6 equal distances, each distance is what part of a mile?" What is the correct answer?

Dividing a Fraction by a Fraction

[Quotients more than 1 and less than 1]

You can divide a fraction by a fraction by using the common-denominator method. To do this, you change the fractions so that they have a common fractional unit; then you divide the numerator of the dividend by the numerator of the divisor.

Finish Ex. 1–4.

1. $\frac{5}{6} \div \frac{1}{3} = \frac{5}{6} \div \frac{2}{6} = 5 \div \_\_\_\_ = \_\_\_\_$

2. $\frac{9}{16} \div \frac{3}{8} = \frac{9}{16} \div \frac{\quad}{16} =$

3. $\frac{2}{3} \div \frac{3}{4} = \frac{\quad}{12} \div \frac{\quad}{12} =$

4. $\frac{1}{6} \div \frac{1}{8} = \frac{\quad}{24} \div \frac{\quad}{\quad} =$

5. To divide a fraction by a fraction, you can divide using just the numerators *only when* the fractions have the same _____.

In dividing a fraction by a fraction, you can always change both dividend and divisor to fractions with a common denominator; but it is usually quicker and easier to divide by inverting the divisor and multiplying, as you have done in dividing a fraction by a whole number.

The box shows Ex. 1 and 3 worked by the inversion method.

a. $\frac{5}{6} \div \frac{1}{3} = \frac{5}{\cancel{6}_{2}} \times \frac{\cancel{3}^{1}}{1} = \frac{5}{2} = 2\frac{1}{2}$

b. $\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{8}{9}$

6. Ex. **a** means that $\frac{5}{6}$ is $2\frac{1}{2}$ times _____, or that there are _____ one thirds in _____. The quotient, $2\frac{1}{2}$, is a how-many-times number because the dividend, _____, is _____ than the divisor, _____.

7. Ex. **b** in the box means that $\frac{2}{3}$ is $\frac{8}{9}$ as large as _____. Why is the quotient a what-part-of number? _____

_____

Work Ex. 8 and 9 by inverting the divisor and multiplying.

8. $\frac{9}{16} \div \frac{3}{8} =$

9. $\frac{1}{6} \div \frac{1}{8} =$

10. Compare Ex. 8 and 9 with Ex. 2 and 4. Which method of solution seems easier?

_____

In Ex. 11–16, use the method that seems easier. Be sure to give your answers in best form.

11. $\frac{7}{8} \div \frac{3}{8} =$

12. $\frac{5}{6} \div \frac{7}{12} =$

13. $\frac{1}{3} \div \frac{1}{2} =$

14. $\frac{3}{4} \div \frac{1}{6} =$

15. $\frac{8}{9} \div \frac{2}{3} =$

16. $\frac{7}{12} \div \frac{3}{8} =$

Dividing by a Mixed Number

[*Dividend a fraction or a mixed number*]

A	B	C
$\frac{5}{6} \div 6\frac{2}{3} = \frac{5}{6} \div \frac{20}{3}$ $= \frac{\overset{1}{\cancel{5}}}{\underset{2}{\cancel{6}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{4}{\cancel{20}}} = \frac{1}{8}$	$4\frac{1}{2} \div 5\frac{2}{5} = \frac{9}{2} \div \frac{27}{5}$ $= \frac{\overset{1}{\cancel{9}}}{2} \times \frac{5}{\underset{3}{\cancel{27}}} = \frac{5}{6}$	$6\frac{2}{3} \div 3\frac{3}{4} = \frac{20}{3} \div \frac{15}{4}$ $= \frac{\overset{4}{\cancel{20}}}{3} \times \frac{4}{\underset{3}{\cancel{15}}} = \frac{16}{9} = 1\frac{7}{9}$

You know how to divide by a fraction. Because any mixed number can be changed to an improper fraction, you also know how to divide by a mixed number.

1. In box A, the dividend, $\frac{5}{6}$, is a fraction; the divisor is a _____ number; the quotient is a proper _____, that is, a number _____ than 1.

2. The quotient in box A shows that $\frac{5}{6}$ is _____ of $6\frac{2}{3}$. Why is the quotient of a proper fraction divided by a mixed number always less than 1? _____

_____

_____

3. In which of boxes B and C is the quotient a how-many-times number? _____ Why? _____

_____

4. Do boxes A, B, and C show the common-denominator method of dividing fractions or the inversion method?

_____

Divide in Ex. 5–22. Cancel when you can.

5. $\frac{9}{10} \div 1\frac{2}{3} =$

6. $3\frac{1}{3} \div 10\frac{2}{3} =$

7. $\frac{4}{7} \div 3\frac{1}{7} =$

8. $1\frac{1}{4} \div 3\frac{2}{3} =$

9. $\frac{3}{4} \div 1\frac{1}{4} =$

10. $3\frac{3}{4} \div 2\frac{1}{4} =$

11. $1\frac{1}{6} \div 3\frac{2}{3} =$

12. $\frac{7}{8} \div 1\frac{1}{3} =$

13. $2\frac{5}{8} \div 2\frac{4}{5} =$

14. $1\frac{3}{4} \div 2\frac{5}{8} =$

15. $\frac{3}{5} \div 2\frac{1}{10} =$

16. $3\frac{3}{4} \div 4\frac{3}{8} =$

17. $2\frac{1}{3} \div 2\frac{1}{2} =$

18. $\frac{5}{6} \div 1\frac{2}{3} =$

19. $7\frac{4}{5} \div 9\frac{3}{4} =$

20. $3\frac{3}{5} \div 4\frac{4}{9} =$

21. $\frac{7}{10} \div 1\frac{5}{9} =$

22. $7\frac{1}{7} \div 12\frac{1}{2} =$

Division with Fractions

1. Judy and Carol are making fruit punch for a party. The recipe calls for $1\frac{1}{2}$ tbsp. of punch mix to each glass of ice water. How many glasses of punch can they make from a bottle of mix containing 24 tablespoonfuls?

HELPER. To find the answer, you divide _____ by _____. First you change $1\frac{1}{2}$ to the improper fraction _____.

Write and work the example in the space below.

They can make _____ glasses of punch.

Divide. Cancel when you can. Show all your work.

2. $\frac{3}{16} \div \frac{1}{8} =$

3. $1\frac{2}{3} \div 5 =$

4. $20 \div \frac{4}{5} =$

5. $12 \div 4\frac{1}{2} =$

6. $3\frac{1}{5} \div \frac{1}{10} =$

7. $\frac{2}{3} \div \frac{4}{5} =$

8. $4\frac{1}{2} \div 1\frac{1}{3} =$

9. $8\frac{2}{3} \div 4 =$

10. $\frac{5}{6} \div \frac{5}{9} =$

11. $9\frac{3}{5} \div 8 =$

12. $\frac{3}{4} \div \frac{1}{2} =$

13. $2 \div 2\frac{1}{2} =$

14. $5\frac{1}{3} \div \frac{2}{3} =$

15. $\frac{1}{2} \div 1\frac{1}{4} =$

16. $2\frac{1}{2} \div 10 =$

17. $\frac{3}{8} \div 6 =$

18. $\frac{4}{5} \div \frac{2}{3} =$

19. $2\frac{5}{8} \div 1\frac{3}{4} =$

20. $8\frac{1}{3} \div \frac{5}{6} =$

21. $6 \div \frac{2}{3} =$

22. $\frac{7}{12} \div 2\frac{5}{8} =$

23. $3\frac{1}{3} \div 5 =$

Relationships in M. and D.

[*Finding* n, *the missing number*]

A

Study these relationships:

(1) Factor × factor = product

$2 \times 3 = 6$

(2) Product ÷ one factor = other factor

$6 \div 2 = 3$

$6 \div 3 = 2$

For the division $6 \div 3 = 2$:

(3) Quotient × divisor = dividend

$2 \times 3 = 6$

(4) Dividend ÷ divisor = quotient

$6 \div 3 = 2$

(5) Dividend ÷ quotient = divisor

$6 \div 2 = 3$

B

Find **n** when

a. **n** is the product of two factors.

$9 \times \frac{2}{3} = n$; $n = 9 \times \frac{2}{3}$. $n =$ _____

b. **n** is one of two factors of a product.

$9 \times n = 6$; $n = 6 \div 9$. $n =$ _____

$n \times \frac{2}{3} = 6$; $n = 6 \div \frac{2}{3}$. $n =$ _____

c. **n** is the dividend.

$n \div \frac{2}{3} = 9$; $n = 9 \times \frac{2}{3}$. $n =$ _____

d. **n** is the quotient.

$6 \div \frac{2}{3} = n$; $n = 6 \div \frac{2}{3}$. $n =$ _____

e. **n** is the divisor.

$6 \div n = 9$; $n = 6 \div 9$. $n =$ _____

1. From statement (2) in box A, you see that we can find either of two factors of a product by dividing the _____ by the _____ that we know.

2. From (3) you see that the quotient and the divisor are both _____ of the dividend.

3. From (4) and (5) you see that if we divide the dividend by the divisor, we get the _____; and if we divide the dividend by the quotient, we get the _____. In each case, we are dividing the dividend by one of its _____ to get the other _____.

The relationships given in box A are always true. It does not matter whether the factors and the product are whole numbers, fractions, or mixed numbers.

4. Finish the examples in box B.

Find **n** in Ex. 5–12. Show all your work.

5. $3 \times \frac{1}{2} = n$; $n =$

6. $n = \frac{1}{4} \times 6$; $n =$

7. $5 = n \div 3$; $n =$

8. $10 \div n = 2$; $n =$

9. $2\frac{1}{2} \times n = 10$; $n =$

10. $n \times 1\frac{1}{2} = 4\frac{1}{2}$; $n =$

11. $\frac{1}{3} = n \div 3$; $n =$

12. $\frac{5}{6} \times n = 15$; $n =$

Solving Problems

Sometimes, when you must solve a problem, it is hard to decide whether you are to find a missing product or a missing factor.

Here is a way that may help you:

a. Let **n** stand for what you must find.
b. Use **n** and the numbers given in the problem to write in arithmetic language exactly what the problem tells you.
c. Think what to do to find **n**.
d. Find **n**.

This method of statements with **n** is used in the chart below to help you solve problems 1–7. Complete the solutions.

1. Mr. Ames drove 240 mi. in 6 hr. How many miles did he average per hour?

2. Edna used 2 yd. of ribbon from a piece. This was $\frac{1}{4}$ of the ribbon in the piece. How much ribbon had there been?

3. After the Maxwells had driven 150 mi., Dad said, "Well, we've gone $\frac{3}{4}$ of the way." How far were they going on the trip?

4. How many feet are there in 17 yd.?

5. Sue took 12 of her 42 snapshots at the beach. What part did she take at the beach?

6. When Esther divided her books into 4 piles, there were 3 books in each pile. How many books did she have in all?

7. Mother said, "You boys may have $\frac{1}{2}$ of the cookies in the jar." If the boys took 16, how many cookies had been in the jar?

Let n stand for	The problem says	To find n	n = ?
1. Average number of miles per hour.	$6 \times n = 240$	Divide	$n = 240 \div 6 =$ _____
2. Number of yards in the piece.	$\frac{1}{4}$ ____ $n = 2$	_____	$n = 2 \div \frac{1}{4} =$ _____
3. Number of miles in the trip.	$\frac{3}{4} \times n = 150$	_____	$n =$ _____
4. Number of feet in 17 yd.	_____	_____	$n =$ _____
5. Part taken at the beach.	$n \times 42 = 12$	Divide	$n =$ _____
6. Number of books in all.	_____	_____	$n =$ _____
7. Number of cookies in the jar.	_____	_____	$n =$ _____

Finding n, the Missing Number

[*A., S., M., D.*]

Suppose you have this problem.

After Ed spent 30¢ he had 45¢ left. How much money did he have at first?

If you let **n** stand for the money he had at first, you can write:

$$n - 30¢ = 45¢$$

Then you can find **n** by adding.

Or, of course, you might state the problem this way:

$$n = 30¢ + 45¢,$$

which makes it even easier to find **n**.

If you can easily find **n**, the missing number, in statements like these, you can solve many problems by the method on page 103.

Find **n**, the missing number. Show all the steps you take.

	a	b	c	d
1.	$n + 6 = 14$ $n =$	$5 = n \div 2$ $n =$	$4 = n \times \frac{1}{8}$ $n =$	$n - 4 = 9$ $n =$
2.	$\frac{1}{8} + n = \frac{7}{8}$ $n =$	$\frac{9}{10} - n = \frac{1}{2}$ $n =$	$\frac{3}{4} = 3 - n$ $n =$	$n + \frac{3}{8} = 1\frac{5}{8}$ $n =$
3.	$7 - n = 2$ $n =$	$12 = 16 - n$ $n =$	$\frac{1}{2} = n \div 6$ $n =$	$n \div 4 = 3$ $n =$
4.	$10 \div n = 5$ $n =$	$4 = 8 \div n$ $n =$	$9 \div n = \frac{3}{4}$ $n =$	$4 = n - 2$ $n =$
5.	$2\frac{1}{4} = n + \frac{1}{4}$ $n =$	$\frac{1}{2} \times n = 5$ $n =$	$8 + n = 10$ $n =$	$10 = n + 4$ $n =$
6.	$n - \frac{3}{5} = 1$ $n =$	$n \times 5 = 15$ $n =$	$1\frac{1}{2} = \frac{1}{4} + n$ $n =$	$n + 3 = 5\frac{3}{4}$ $n =$
7.	$20 = 4 \times n$ $n =$	$\frac{1}{2} = n - 2\frac{1}{2}$ $n =$	$n \div \frac{1}{8} = 8$ $n =$	$n \times \frac{3}{4} = 6$ $n =$

Line Graphs

1. Graph A shows how Jim's puppy increased in weight during his first 6 _____.

2. The horizontal scale shows the _____, and the vertical scale shows the _____.

3. The weight scale shows that 1 small space is equal to _____ oz.

4. To read the graph, follow the arrows.

a. When the puppy was born, he weighed _____ oz.

b. At 3 mo. the puppy's weight was _____.

c. The puppy gained more weight between _____ mo. and _____ mo. than during any other month.

5. Complete table B below the graph.

6. Could you show the puppy's weight by a bar graph? _____ Explain how. _____

_____

Graph C shows, to the nearest 5 feet, the number of feet a car travels after the brakes are applied.

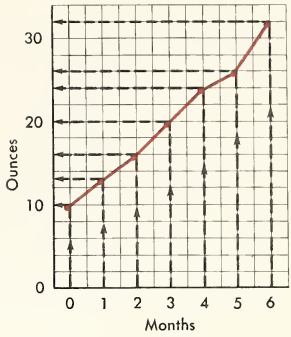
7. The numbers on the horizontal scale show speeds in _____ per _____.

8. On the vertical scale, one of the small spaces stands for _____ ft.

9. The graph shows that at 20 mi. per hour a car travels _____ ft. before stopping. Complete the table below.

Speed in miles per hour	20	30	40	50	60
Feet car travels					

A

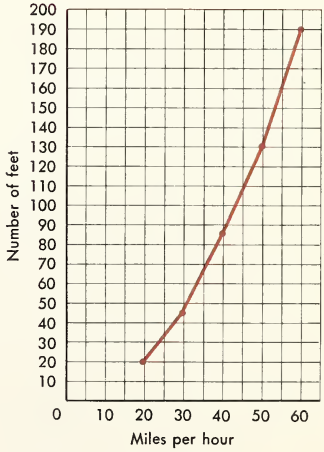


How Jim's Puppy Grew

B

Age	Weight
At birth	10 oz.
1 mo.	
2 mo.	
3 mo.	
4 mo.	
5 mo.	
6 mo.	

C



Stopping Distance for Car after Brakes Have Been Applied

Drawing Line Graphs

As you have found, it is easy to read a bar graph or a line graph. Sometimes, however, it takes a bit of figuring to decide what scale to use in drawing a graph.

If you have small numbers to show on a graph, you can let 1 small space on the number scale stand for 1 unit. If the numbers are large, it is usually better to round them first and to let 1 small space stand for more than 1 unit.

To decide on the scale, look at the smallest number and the largest number in the group of numbers to be graphed.

In figuring the following, suppose that you will use the graph paper below:

1. On this graph paper there are _____ divisions to the inch.

2. If the smallest number to be shown on a line graph is 2 ft. and the largest is 20 ft., you might let 1 small space = 1 ft. Then the highest point on the graph would be how many spaces high?

_____

3. In Ex. 2, if you let 1 space = 2 ft., then the point for 20 ft. would be _____ spaces high. A point representing 11 ft. would be _____ spaces high.

4. If you want to graph numbers of which the smallest is 3,208 ft. and the largest is 17,849 ft., you had better round the numbers to the nearest

_____.

5. If you round 3,208 and 17,849 to thousands, you get _____ thousand and _____ thousand for your lowest and highest points.

6. Then if you let 1 small space = 1 thousand feet, the highest point on your graph (for 17,849, rounded to _____ thousand) will be _____ spaces high.

On the graph paper below, draw line graphs to show the facts in these tables:

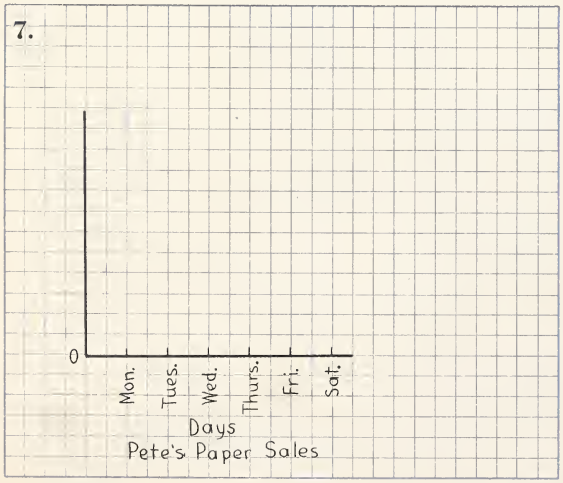
7. Pete sold these papers last week:

Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
20	30	25	35	50	40

8. The Charity Fund grew as follows:

At end of →	1 wk.	2 wk.	3 wk.	4 wk.
Total →	$1,619	$2,760	$4,842	$5,716

7.



8.

A Review of Fractions

Do what the signs tell you to do.

	a	b	c	d	e
1.	$\frac{5}{16}$ $+ 2\frac{7}{8}$	$23\frac{1}{2}$ $+ 10\frac{1}{3}$	$14\frac{3}{4}$ $+ 9\frac{2}{3}$	$8\frac{1}{4}$ $+ 5\frac{5}{6}$	$4\frac{3}{4}$ $+ 2\frac{3}{5}$
2.	$10\frac{1}{5}$ $- 8\frac{1}{10}$	$24\frac{1}{8}$ $- 10\frac{1}{3}$	$6\frac{2}{9}$ $- 3\frac{5}{6}$	$9\frac{1}{2}$ $- 6\frac{2}{3}$	$7\frac{1}{3}$ $- 2\frac{1}{4}$

	a	b	c
3.	$\frac{4}{5} \times 45 \times \frac{1}{3} \times \frac{1}{6} =$	$1\frac{5}{16} \times \frac{3}{5} \times \frac{8}{9} \times 20 =$	$6 \times \frac{7}{8} \times \frac{3}{4} \times \frac{4}{7} =$
4.	$\frac{2}{3} \div 6 =$	$1\frac{7}{8} \div 1\frac{2}{3} =$	$\frac{3}{7} \div 1\frac{1}{2} =$
5.	$2\frac{1}{2} \div \frac{5}{6} =$	$8 \div \frac{2}{5} =$	$3\frac{3}{4} \div 1\frac{7}{8} =$

For each problem tell whether you will add, subtract, multiply, or divide. Then solve, and draw a ring around the answer.

Space for Work

6. Ava spent $\frac{3}{4}$ hr. making apricot sauce. After soaking the dried apricots, she simmered them for $\frac{1}{2}$ hr. How long did she soak them?

A.? S.? M.? D.? _____

7. The comic strips in a newspaper just fit across 4 columns of newsprint. If these comic strips are $7\frac{1}{2}$ in. wide, how wide is a column of newsprint?

A.? S.? M.? D.? _____

8. A square skillet, $10\frac{1}{4}$ in. on a side, has a $4\frac{7}{8}$-inch handle on one side. How long is the skillet including the handle?

A.? S.? M.? D.? _____

9. A strong paste for mending books can be made by mixing 1 tsp. flour, 2 tsp. cornstarch, and $\frac{1}{4}$ tsp. powdered alum, adding 3 oz. water, and cooking in a double boiler until thick. Find **a.** the ratio of flour to cornstarch; **b.** the ratio of alum to cornstarch.

A.? S.? M.? D.? _____

Testing What You Have Learned

[*Cumulative Review*]

Add, subtract, multiply, or divide, as the signs tell you.

	a	b	c	d	e
1.	$23.06 + 15.98	5 ft. 8 in. + 2 ft. 6 in.	3 lb. 9 oz. + 4 lb. 8 oz.	4,912 + 26,397	395,428 + 872,906
2.	$85.98 − 27.50	70,652 − 9,084	$130.75 − 22.15	6 lb. 3 oz. − 5 lb. 9 oz.	8 ft. 9 in. − 4 ft. 10 in.
3.	3,216 × 45	$6.75 × 32	4 ft. 3 in. × 5	3 qt. 1 pt. × 2	$3\frac{1}{2}$ × 2

Write any remainder in a fraction in best form.

4. $72\overline{)4,116}$ $48\overline{)1,830}$ $4\overline{)5 \text{ yd. } 1 \text{ ft.}}$ $2\overline{)3 \text{ hr. } 20 \text{ min.}}$ $6\overline{)\$10.44}$

5. Round as directed:

	a. 1,784	b. 32,465
To the nearest thousand	_____	_____
To the nearest hundred	_____	_____
To the nearest ten	_____	_____

6. From $\frac{1}{9}$, $6\frac{7}{8}$, $\frac{5}{4}$, and 9, choose an example of a

a. Mixed number _____
b. Numerator _____
c. Divisor _____
d. Proper fraction _____
e. Denominator _____
f. Dividend _____
g. Fractional unit _____
h. Improper fraction _____

Give the smallest common denominator for

7. $\frac{1}{8}$'s and $\frac{1}{4}$'s. _____
8. $\frac{1}{6}$'s and $\frac{1}{9}$'s. _____

Find the ratio of

9. 3 to 9. _____
10. 8 to 2. _____
11. 4 ft. to 5 ft. _____
12. 6 in. to 1 ft. _____

Write in figures the numbers in Ex. 13–15.

13. Six hundred fifty-two thousand four hundred thirty-five _____

14. Two billion nine hundred sixty thousand four hundred fifty _____

15. Three million six hundred thousand _____

16. Round to the nearest whole number.

a. $15\frac{7}{8}$ _____ b. $33\frac{1}{3}$ _____ c. $4\frac{5}{12}$ _____

17. Change

a. $\frac{2}{3}$ to sixths. _____

b. $3\frac{5}{8}$ to an improper fraction. _____

c. $1\frac{5}{6}$ to best form. _____

d. $1\frac{2}{16}$ to lowest terms. _____

18. In a picture of a dog to the scale $\frac{1}{24}$, the dog's tail is drawn $\frac{1}{2}$ inch long. How long is the real dog's tail?

_____

19. Joe weighs 120 lb. His father weighs 160 lb.

a. Joe's weight is what fractional part of his father's?

_____

b. Joe's father is how many times as heavy as Joe?

_____

Divide. Use cancellation when you can.

20. $1\frac{7}{8} \div 6 =$

21. $3\frac{1}{8} \div 5 =$

22. $4\frac{3}{8} \div 7 =$

23. $8\frac{2}{3} \div 4 =$

24. $9\frac{3}{5} \div 8 =$

Divide. Give answers in best form.

25. $\frac{5}{6} \div \frac{5}{9} =$

26. $\frac{3}{4} \div \frac{1}{2} =$

27. $\frac{8}{9} \div \frac{2}{3} =$

28. $\frac{7}{12} \div \frac{3}{8} =$

29. $4\frac{1}{2} \div 1\frac{1}{3} =$

30. $2\frac{5}{8} \div 1\frac{3}{4} =$

Find answers for problems 31–34.

31. Sara paid 16¢ to mail a parcel. The postage rate was 10¢ for the first pound and $1\frac{1}{2}$¢ for each additional pound. How much did the parcel weigh?

_____

32. Doris put 9 books, each $\frac{7}{8}$ in. thick, together on the library shelf. How much shelf space did they take?

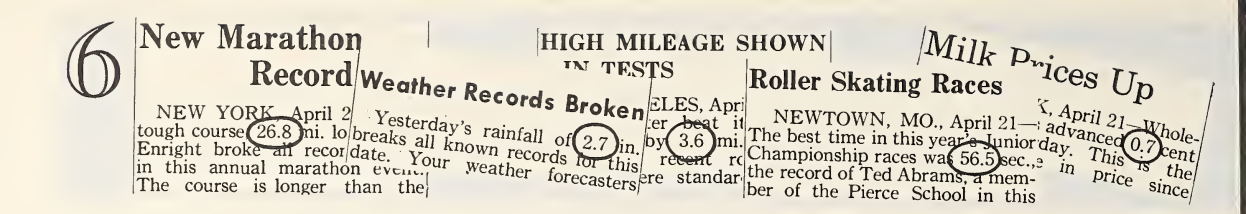
_____

33. Sue said, "My father is $2\frac{3}{4}$ times as old as I am." Sue is 12 yr. old. How old is Sue's father?

_____

34. Ralph has used 13 pages of his album to mount 234 stamps. Find the average number of stamps to a page.

_____



Understanding Decimal Fractions

Miss Bryan's pupils looked for decimals in the newspaper. They found the items above.

1. All the decimal fractions in these clippings are _____. They have the same fractional unit, _____.

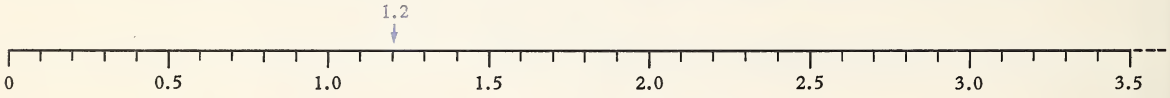
2. Write the ringed numbers in these clippings with common fractions.

a. 26.8 = _____ b. 2.7 = _____ c. 3.6 = _____ d. 56.5 = _____

e. 0.7 = _____

3. In 0.7, the 0 means _____.

4. The mixed decimal 3.6 is the sum of the whole number ___ and the decimal fraction _____. Written with a common fraction, 3.6 is _____, or in best form _____.



5. Mark with an arrow and label the following points on the number line above:

a. 1.6 b. 0.3 c. $\frac{7}{10}$ d. 1.9 e. 2.4 f. 3.1 g. $2\frac{9}{10}$ h. 3.4

6. Complete the table below to show counting by tenths from 3.0 to 4.0

3.0, or 3

3.1, or $3\frac{1}{10}$

3.2, or $3\frac{2}{10}$, or $3\frac{1}{5}$

_____

_____

_____

_____

_____

_____

_____

4.0, or _____

Match the decimals below to Ex. 7–16.

1.1	0.8	101.2	8.0	4.2
20.4	2.4	0.2	100.1	10.1

7. One and one tenth _____

8. Four and two tenths _____

9. Eight tenths _____

10. Twenty and four tenths _____

11. Ten and one tenth _____

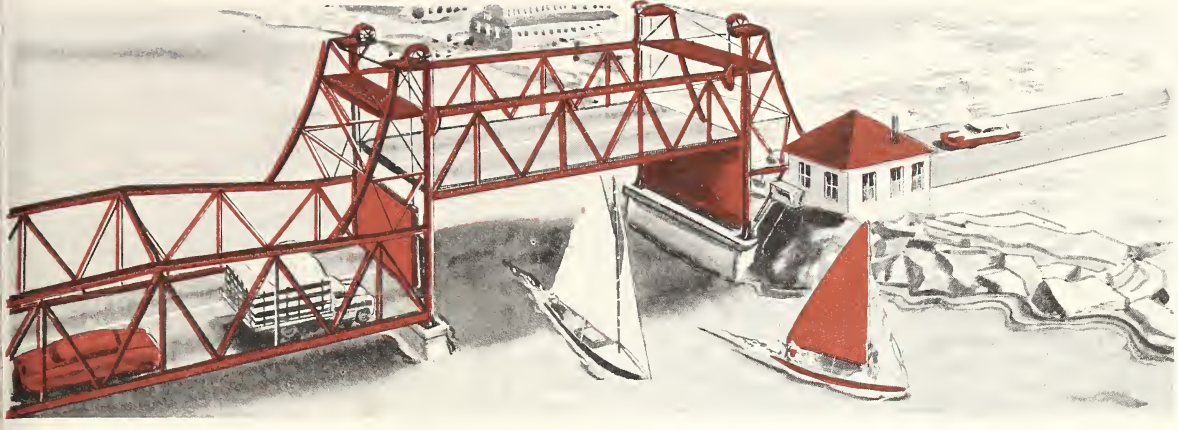
12. Eight _____

13. One hundred and one tenth _____

14. Twenty-four tenths _____

15. One hundred one and two tenths _____

16. Two tenths _____



High Tide, Low Tide, and Decimals

[*A. and S. of tenths*]

1. One day in April at San Diego, California, the height of high tide was 3.8 ft. The height of high tide at Boston, Massachusetts, was 5.9 ft. more than this, or _?_ ft.

A	B
$3\frac{8}{10}$ $+\ 5\frac{9}{10}$ $8\frac{17}{10} =$ $9\frac{7}{10}$	$\overset{1}{}$ 3.8 + 5.9 9.7

Boxes A and B show two ways of adding. In adding decimals, carry just as you do in adding whole numbers.

The height of high tide at Boston that day was _____ ft. Is the work in box A a check for the work in box B? _____

2. In a drawbridge across a small tidal river, the draw rises 36.2 ft. above average low tide and 27.6 ft. above average high tide. Find the difference between high and low tides.

C	D
$36\frac{2}{10} = 35\frac{12}{10}$ $-\ 27\frac{6}{10} = 27\frac{6}{10}$ $8\frac{6}{10}$	$\overset{2}{\cancel{3}}\overset{(15)}{\cancel{6}}.\overset{(12)}{2}$ $-\ 27.6$ 8.6

Boxes C and D show the work. In box D, do we borrow just as we do in subtracting whole numbers? _____ The difference is _____ ft.

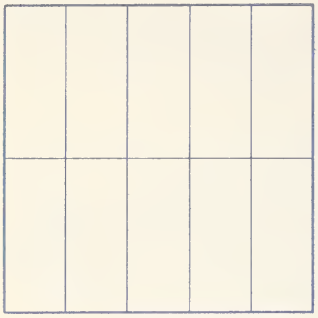
Add or subtract. Try to think the carrying and borrowing.

	a	b	c	d	e	f	g	h	i
3.	6.4 +6.3	4.2 +1.7	5.5 +0.9	2.3 +10.0	97.3 +3.4	12.6 +5.1	6.6 +27.7	376.8 +276.4	162.9 +653.7
4.	8.5 −6.2	9.0 −3.5	2.6 −0.7	69.1 −55.8	43.7 −36.4	77.4 −36.7	62.9 −45.5	653.8 −325.3	338.4 −242.9
5.	6.8 +2.5	1.6 −0.8	6.3 −3.7	18.7 +35.4	55.2 −35.3	89.3 +64.6	82.0 −63.6	102.6 −64.2	218.3 +823.8
6.	4.9 +8.3	8.4 −7.8	7.7 +8.9	97.6 +9.9	60.1 −37.6	68.0 +51.9	31.8 −22.7	963.3 −899.8	270.5 +904.0

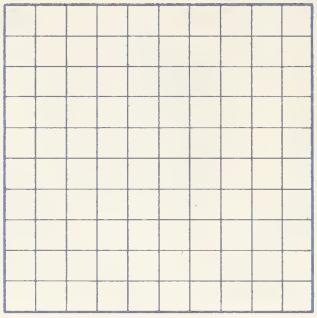
Tenths, Hundredths, Thousandths

[*Meaning*]

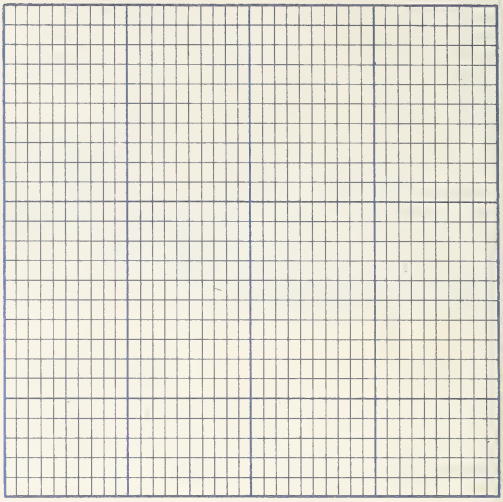
A



B



C



1. Square A is divided into _____ equal parts. So 1 of the equal parts is $\frac{1}{\text{——}}$, or 0.1, of the whole square.

2. Color square A: **a.** $\frac{3}{10}$ red; **b.** 0.1 black.

3. What decimal fraction of square A is not colored? _____

4. Are the equal parts of square B larger or smaller than those of square A?

_____

5. In square B there are _____ equal rows, with _____ equal parts in each row, making _____ equal parts into which the whole square is divided.

6. Each part of square B is $\frac{1}{\text{——}}$, or 0.01, of the whole square. We read 0.01 as "one hundredth."

7. 0.05 = $\frac{\text{——}}{100}$. Color 0.05 of square B red.

8. 0.10 = $\frac{10}{\text{——}}$. Make 0.10 of square B black.

9. Square C has _____ rows of _____ equal parts each, or _____ equal parts in all.

10. Each part of square C is $\frac{1}{\text{——}}$ of the square. The decimal form is 0.001

11. Write $\frac{6}{1,000}$ as a decimal fraction.

_____

12. Color 0.006 of square C red.

13. Complete the following table:

Common Fraction	Decimal Fraction
$\frac{7}{10}$	
$\frac{309}{1,000}$	
$\frac{3}{100}$	
$\frac{77}{1,000}$	
$\frac{50}{100}$	
	0.39
	0.9
	0.057
	0.003
	0.30

Adding and Subtracting Hundredths and Thousandths

[*Like-fractions*]

A	B	C
$\begin{array}{r} 0.84 \\ +0.08 \\ \hline \end{array}$ $\begin{array}{r} 1.44 \\ +0.09 \\ \hline \end{array}$	$\begin{array}{r} 0.84 \\ -0.76 \\ \hline \end{array}$ $\begin{array}{r} 1.44 \\ -1.06 \\ \hline \end{array}$	$\begin{array}{r} 1.375 \\ +1.375 \\ \hline \end{array}$ $\begin{array}{r} 6.250 \\ -2.750 \\ \hline \end{array}$

1. Ed Myers collects United States commemorative stamps such as those shown above. The catalogue issued by the United States Post Office Department lists the dimensions of the printed part of these stamps as 0.84 in. (high) by 1.44 in. (wide).

Ed estimated that the perforations increase the height of a stamp by 0.08 in. and the width by 0.09 in.

Find the height and width including perforations. Finish the work in box A.

2. The Pan-American stamps of 1901 are 0.76 in. high and 1.06 in. wide, not including perforations. Find the difference in the dimensions of these stamps and the stamps shown above. Finish the work in box B.

3. Ed wanted to make a special sheet of a few stamps as a present. Each stamp was 1.375 in. wide. If he mounted 2 stamps on a sheet 6.250 in. wide, how much space would be left? Finish the work in box C.

Add in rows 4 and 5.

	a	b	c	d	e	f	g
4.	$\begin{array}{r} \$1.65 \\ +0.32 \\ \hline \end{array}$	$\begin{array}{r} 9.78 \\ +1.14 \\ \hline \end{array}$	$\begin{array}{r} 5.84 \\ +4.16 \\ \hline \end{array}$	$\begin{array}{r} \$4.63 \\ +0.87 \\ \hline \end{array}$	$\begin{array}{r} \$7.50 \\ +4.10 \\ \hline \end{array}$	$\begin{array}{r} 6.333 \\ +1.420 \\ \hline \end{array}$	$\begin{array}{r} 3.875 \\ +5.125 \\ \hline \end{array}$
5.	$\begin{array}{r} 4.76 \\ +7.92 \\ \hline \end{array}$	$\begin{array}{r} 7.24 \\ +3.99 \\ \hline \end{array}$	$\begin{array}{r} 9.17 \\ +4.65 \\ \hline \end{array}$	$\begin{array}{r} \$5.05 \\ +0.98 \\ \hline \end{array}$	$\begin{array}{r} \$6.25 \\ +7.89 \\ \hline \end{array}$	$\begin{array}{r} 9.378 \\ +2.375 \\ \hline \end{array}$	$\begin{array}{r} 7.364 \\ +7.451 \\ \hline \end{array}$

Subtract in rows 6 and 7.

6.	$\begin{array}{r} \$3.75 \\ -2.40 \\ \hline \end{array}$	$\begin{array}{r} \$9.60 \\ -3.75 \\ \hline \end{array}$	$\begin{array}{r} 3.98 \\ -3.25 \\ \hline \end{array}$	$\begin{array}{r} \$1.75 \\ -1.55 \\ \hline \end{array}$	$\begin{array}{r} \$0.75 \\ -0.33 \\ \hline \end{array}$	$\begin{array}{r} 0.740 \\ -0.452 \\ \hline \end{array}$	$\begin{array}{r} 1.351 \\ -0.366 \\ \hline \end{array}$
7.	$\begin{array}{r} \$9.36 \\ -6.76 \\ \hline \end{array}$	$\begin{array}{r} 3.14 \\ -2.42 \\ \hline \end{array}$	$\begin{array}{r} 5.00 \\ -3.64 \\ \hline \end{array}$	$\begin{array}{r} \$4.01 \\ -0.73 \\ \hline \end{array}$	$\begin{array}{r} 2.15 \\ -0.69 \\ \hline \end{array}$	$\begin{array}{r} 5.652 \\ -4.548 \\ \hline \end{array}$	$\begin{array}{r} 7.733 \\ -3.849 \\ \hline \end{array}$

Adding and Subtracting When Decimal Fractions Are Unlike

Complete the following table to show equivalent (equal) fractions:

	Tenths		Hundredths		Thousandths
1.	0.1	=	0.10	=	0.100
2.	0.3	=	0.30	=	_____
3.	0.7	=	_____	=	_____
4.	_____	=	0.40	=	_____
5.	_____	=	_____	=	0.800
6.	_____	=	0.90	=	_____
7.	_____	=	_____	=	0.200
8.	0.5	=	_____	=	_____

[*Exact decimals*]

Write each number in this list beside the number in Ex. 9–20 which it equals.

0.01 3.5 2.02 0.2
2.0 0.1 0.35 1.0
35 2.75 0.02 202

9. 2.020 _____
10. 35.0 _____
11. 1.00 _____
12. 2.750 _____
13. 0.010 _____
14. 2 _____
15. 3.50 _____
16. 0.20 _____
17. 202.0 _____
18. 0.10 _____
19. 0.350 _____
20. 0.020 _____

A

Common Fractions	Decimals
$\frac{3}{10} = \frac{300}{1,000}$	0.3 = 0.300
$\frac{1}{100} = \frac{10}{1,000}$	0.01 = 0.010
$+\ \frac{7}{1,000} = \frac{7}{1,000}$	+ 0.007 = 0.007
$\frac{317}{1,000}$	0.317

B

Common Fractions	Decimals
$\frac{5}{10} = \frac{500}{1,000}$	0.5 = 0.500
$-\ \frac{75}{1,000} = \frac{75}{1,000}$	− 0.075 = 0.075
$\frac{425}{1,000}$	0.425

Fractions to be added or subtracted must be like-fractions.

First study the additions and subtractions in boxes A and B. Then in each example below, write zeros to give all the numbers the same fractional unit. Then add or subtract as directed.

	a	b	c	d	e	f
21.	0.6 0.39 +0.02	0.825 0.04 +0.5	0.95 2.6 +1.375	4.04 3.3 +2.767	11.33 6.063 +4.9	8.8 0.08 +9.9
22.	0.53 −0.2	6.7 −4.33	9.75 −3.936	3. −1.45	8.063 −3.8	7.4 −4.267
23.	9.8 −4.27	3.81 +6.5	7.424 +1.81	4.753 −2.9	5.49 −5.049	9.186 +2.9
24.	0.4 +9.72	7.3 −6.444	4. −0.667	8.82 −3.142	56.71 +8.8	3.04 −1.206

Comparing Decimals

Here are some quick ways to tell whether one decimal is larger or smaller than another:

1. You know that 0.7 is more than 0.5 because 7 ____tenths_____ are more than 5 _____.

2. 0.7 is more than 0.64 because 0.7 equals _____ hundredths, and _____ hundredths are more than _____ hundredths.

3. 0.361 is more than 0.36 because _____ thousandths are more than _____ thousandths.

4. Any mixed decimal, like 1.1, is more than any decimal fraction, like 0.879, because a decimal fraction is always less than _____.

5. If two mixed decimals have different whole numbers, the one with the _____ whole number is the larger number.

4.795 is _____ than 5.1

Draw a ring around the larger number in each of these pairs of numbers:

6.	0.75	0.85
7.	0.23	0.023
8.	0.995	9.95
9.	0.87	0.89
10.	0.04	0.4
11.	50	5.00
12.	1.98	2.1
13.	0.6	0.61

In each of rows 14–19, underline the number that is smallest.

14.	0.45	0.045	4.5
15.	1.2	0.12	0.012
16.	59.035	59.3	59.35
17.	0.879	2.98	3
18.	40.4	4.04	0.404
19.	22.66	26.26	26.62

Write a number that is

20. Smaller than either 0.08 or 0.6

_____

21. Larger than either 6.5 or 7.29 _____

22. More than 0.05 and less than 0.5

_____

23. Less than 2.4 and more than 2.3 _____

24. More than 0.5 and less than 1 _____

25. Larger than 2.8 but smaller than 3

_____

26. Smaller than 5.15 but larger than 3.09

_____

27. Less than 24.0 and more than 14.9

_____

28. Smaller than 30.2 and larger than 25

_____

29. More than 7.008 but less than 7.1

_____

30. Between 40.4 and 40.45 _____

Find the Mistakes!

For a quick test, Miss Bryan wrote some examples on slips of paper and let each pupil work one. Check each pupil's work. If it is not correct, copy the example and work it correctly. Write the correct answer on the line after each example.

1. Bill: $1.375 + 2.5 =$ _____

$$\begin{array}{r} 1.375 \\ +\,2.005 \\ \hline 3.380 \end{array}$$

2. Pete: $1 + 0.01 =$ _____

$$\begin{array}{r} 1.00 \\ +\,0.01 \\ \hline 1.01 \end{array}$$

3. Bob: $4.6 - 2.80 =$ _____

$$\begin{array}{r} 4.60 \\ -\,2.80 \\ \hline 1.80 \end{array}$$

4. Joe: $6 + 1.8 =$ _____

$$\begin{array}{r} 0.06 \\ +\,0.18 \\ \hline 0.24 \end{array}$$

5. Anne: $0.38 + 2.26 =$ _____

$$\begin{array}{r} 0.38 \\ +\,2.26 \\ \hline 2.64 \end{array}$$

6. Laurie: $0.61 + 5 + 7.75 =$ _____

$$\begin{array}{r} 0.61 \\ 5 \\ +\,7.75 \\ \hline 8.41 \end{array}$$

7. Carol: $3.48 - 1.3 =$ _____

$$\begin{array}{r} 3.48 \\ -\,1.33 \\ \hline 2.15 \end{array}$$

8. Dan: $0.2 + 0.07 + 0.03 =$ _____

$$\begin{array}{r} 0.02 \\ 0.07 \\ +\,0.03 \\ \hline 0.12 \end{array}$$

9. Sam: $8 - 2.5 =$ _____

$$\begin{array}{r} 80 \\ -\,25 \\ \hline 65 \end{array}$$

10. Lorna: $10.4 + 1.04 =$ _____

$$\begin{array}{r} 1.04 \\ +\,1.04 \\ \hline 2.08 \end{array}$$

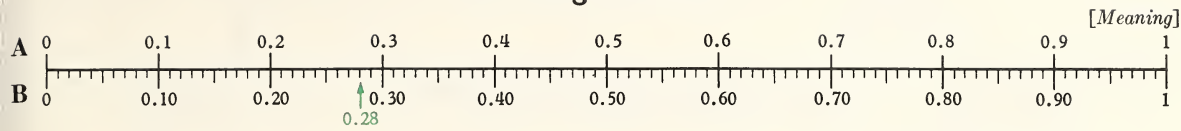
11. Sally: $40 - 0.44 =$ _____

$$\begin{array}{r} 40.00 \\ -\,0.44 \\ \hline 39.56 \end{array}$$

12. Ben: $85 - 8.5 =$ _____

$$\begin{array}{r} 85 \\ -\,8.5 \\ \hline 0 \end{array}$$

Rounding Decimals



1. Suppose you want to round a mixed decimal, like 5.8, to the nearest whole number. You round mixed decimals in the same way that you have rounded other numbers.

For 5.8 you must decide whether the decimal fraction 0.8 is nearer to 0 or to _____.

2. Find 0.8 on scale A above. You see that 0.8 is nearer to 1 than to _____. So, to the nearest whole number, 0.8 is rounded to _____.

3. Rounded to the nearest whole number, 5.8 is _____.

4. Use scale A to help you round these decimal fractions to either 0 or 1. Remember that you round 0.5 upward.

a. 0.3 _____ e. 0.9 _____

b. 0.1 _____ f. 0.4 _____

c. 0.5 _____ g. 0.2 _____

d. 0.7 _____ h. 0.6 _____

5. The fractional unit on scale B is _____. In 1 there are _____ hundredths; that is, $1 = \frac{\quad}{100}$.

6. In 0.1 there are _____ hundredths.

7. 0.28 lies between 0.2 and _____; it is nearer to _____ than to _____; so rounded to the nearest tenth, 0.28 is _____.

8. Rounded to the nearest tenth, 0.23 is _____.

9. Show these points on scale B, and then round each number to the nearest tenth:

a. 0.17 _____ e. 0.07 _____

b. 0.61 _____ f. 0.36 _____

c. 0.74 _____ g. 0.52 _____

d. 0.99 _____ h. 0.85 _____

10. Round each of the following decimals to the nearest tenth:

a. 16.34 _____ e. 2.66 _____

b. 5.05 _____ f. 19.75 _____

c. 4.41 _____ g. 6.70 _____

d. 8.98 _____ h. 10.83 _____

11. Round to the nearest whole number:

a. 13.5 _____ e. 18.2 _____

b. 8.62 _____ f. 9.9 _____

c. 3.4 _____ g. 7.35 _____

d. 1.58 _____ h. 0.73 _____

12. Using what you have learned about tenths and hundredths, round each of these decimals to the nearest hundredth:

a. 0.321 _____ f. 5.398 _____

b. 0.148 _____ g. 0.515 _____

c. 6.476 _____ h. 2.902 _____

d. 0.094 _____ i. 8.009 _____

e. 9.207 _____ j. 4.197 _____

Using Measurement Numbers

[*A. and S.*]

One day Bob helped his father check the figures on a land survey. His father asked Bob to add 814.37 ft. and 732.5 ft.

814.37 ft.	814.4
+ 732.5 ft.	+ 732.5
	1,546.9 (ft.)

Bob thought he should write 732.5 as hundredths before adding, but his father told him that instead he should round 814.37 to tenths because these are measurement numbers.

1. Bob's father said that 732.5 ft. is a less accurate measure than 814.37 ft. because the fraction 0.5 might have been rounded from a fraction as small as 0.45 or as large as

---.

2. The hundredths that can be rounded to 0.5 are:

0.45, ---, ---, ---, ---,

---, ---, ---, ---, ---.

3. So, unless you know that the distance 732.5 ft. was actually 732.50 ft. to the nearest hundredth, you should not change the decimal to hundredths. To make the measurement numbers 814.37 ft. and 732.5 ft. have the same fractional unit, you round 814.37 to

---.

4. Of the measurement numbers 814.37 and 732.5, the one with the larger fractional unit is

---.

Before adding or subtracting measurement decimals, find the one with the largest fractional unit. Express all the other numbers in the group with this fractional unit.

Add or subtract these measurement numbers:

	a	b	c
5.	3.2 in. + 5.75 in.	8.312 in. + 3.25 in.	50.28 mi. + 8.9 mi.
6.	8.6 oz. − 2.86 oz.	6.25 in. − 4.125 in.	9.833 yd. − 4.50 yd.
7.	12.3 yd. + 2.67 yd.	1.114 ft. + 0.75 ft.	0.625 mi. + 1.4 mi.

Decimals and Their Equivalent Common Fractions

A	B	C	D
$0.25 = \frac{25}{100} = \frac{1}{4}$	$0.5 = \frac{5}{10} = \frac{1}{2}$	$0.375 = \frac{375}{1{,}000} = \frac{3}{8}$	$0.10 = \frac{10}{100} = \frac{1}{10}$

Sometimes it is easier to use a common fraction like $\frac{1}{4}$ than a decimal fraction like 0.25. So it is convenient to be able to change a decimal fraction to a common fraction.

1. Look at box A. 0.25 means _____ hundredths, which, as a common fraction, is written $\frac{25}{\quad}$, or, in lowest terms, $\frac{\quad}{\quad}$.

2. In box B, how was $\frac{5}{10}$ changed to $\frac{1}{2}$?

_____

3. To change $\frac{375}{1{,}000}$ to lowest terms (box C), you could first divide both 375 and _____ by 5; then you could reduce the resulting fraction again. Finish the work started below.

$\frac{375}{1{,}000} = \frac{75}{\quad} =$

You can change $\frac{375}{1{,}000}$ to lowest terms in one step. You may have noticed that 375 is exactly 3×125. See if 125 is contained in 1,000 without a remainder. $1{,}000 \div 125 =$ _____. Then $\frac{375}{1{,}000} =$ _____.

4. $0.50 is what fractional part of a dollar? _____ Show all the steps to prove it.

_____

Change the following to common fractions in lowest terms. Show all the steps you take.

8. 0.4 =

9. 0.60 =

13. 0.625 =

10. 0.7 =

10. 0.025 =

14. 0.80 =

. 0.90 =

11. 0.15 =

15. 0.48 =

. 0.75 =

12. 0. 2 =

16. 0.232 =

17. Finish the tables below.

Halves and Fourths	Fifths	Eighths
$0.25 = \frac{25}{100} = \frac{1}{4}$	$0.20 = \frac{20}{100} = \frac{1}{\quad}$	$0.125 = \frac{125}{1{,}000} = \frac{1}{8}$
$0.50 = \frac{\quad}{100} =$	0.40 = _____	0.375 = _____
$0.75 = \frac{75}{\quad} =$	0.60 = _____	0.625 = _____
	0.80 = _____	0.875 = _____

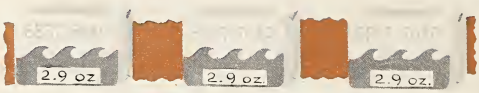
Multiplying Decimals by Whole Numbers

[*Tenths*]

A	B	C
0.7 0.7 + 0.7 2.1	7 tenths × 3 21 tenths, or 2.1	0.7 × 3 2.1

1. Sandra had 3 candy bars. Each bar weighed 0.7 oz. All 3 bars weighed how many ounces? Boxes A–C show three ways to find the answer. Write it below.

_____



D	E
$3 \times 2\frac{9}{10} = 3 \times \frac{29}{10} = \frac{87}{10} = 8\frac{7}{10}$	2.9 × 3 8.7

2. One of the small cakes of soap used in hotels weighs 2.9 oz. How much do 3 cakes weigh? Boxes D and E show two ways to multiply. Write the answer below.

_____

Study the work in boxes C and E until you understand how to multiply a decimal fraction or a mixed decimal by a whole number. Then do the work in rows 3–5.

	a	b	c	d
3.	$5 \times 0.1 =$ _____	$4 \times 0.9 =$ _____	$5 \times 0.6 =$ _____	$5 \times 0.8 =$ _____
4.	$7 \times 0.2 =$ _____	$3 \times 0.4 =$ _____	$4 \times 0.2 =$ _____	$6 \times 0.3 =$ _____
5.	$3 \times 0.5 =$ _____	$9 \times 0.1 =$ _____	$6 \times 0.7 =$ _____	$7 \times 0.4 =$ _____

When a number with the fractional unit $\frac{1}{10}$ is multiplied by a whole number, the product must show tenths.

	a	b	c	d	e	f	g	h	i
6.	1.3 × 4	7.2 × 5	2.2 × 9	3.5 × 3	5.7 × 6	8.4 × 2	7.5 × 3	4.5 × 2	6.4 × 7
7.	4.7 × 3	5.4 × 9	3.6 × 4	7.4 × 2	2.7 × 4	1.5 × 5	8.1 × 5	6.6 × 2	2.5 × 3

In each of Ex. 8–17, draw a ring around the correct answer.

8.	$3 \times 1.2 =$	3.6	0.36	36
9.	$2 \times 3.5 =$	70	0.7	7.0
10.	$8 \times 0.1 =$	0.08	0.8	8.0
11.	$3 \times 0.8 =$	0.24	2.4	0.024
12.	$5 \times 0.5 =$	2.5	0.25	25.0
13.	$5 \times 4.1 =$	2.05	20.5	0.205
14.	$2 \times 6.0 =$	12.0	0.12	1.20
15.	$1 \times 1.6 =$	0.16	1.6	1.60
16.	$2 \times 8.2 =$	1.64	0.164	16.4
17.	$3 \times 2.3 =$	6.9	0.69	69

Multiplying Hundredths and Thousandths

[*Multiplier a whole number*]

A

$1.35
× 5
$6.75

B

$2.98
× 20
$59.60

C

$0.75
× 12
1 50
7 5
$9.00,
or $9

D

4.105
× 24
16 420
82 10
98.520,
or 98.52

E

0.035
× 15
175
35
0.525

F

When a decimal is multiplied by a whole number, the product has the same fractional unit as the decimal factor, and so must show the same number of decimal places.

Study the work in boxes A–E and the statement in box F. Then work Ex. 1–30. Make sure that each product has the correct fractional unit (the same number of decimal places as the decimal factor). Then reduce the decimal fraction if possible.

1. 0.38 × 3	**2.** $6.04 × 3	**3.** 0.106 × 9	**4.** 0.007 × 8	**5.** $0.75 × 7
6. 3.024 × 6	**7.** 0.407 × 4	**8.** 1.4 × 5	**9.** 9.1 × 6	**10.** 0.018 × 7
11. 0.19 × 12	**12.** 12.7 × 26	**13.** 0.06 × 92	**14.** $3.49 × 90	**15.** $8.05 × 96
16. 2.375 × 38	**17.** $8.75 × 80	**18.** 1.048 × 18	**19.** 0.265 × 16	**20.** 4.5 × 21
21. $5.32 × 5	**22.** 0.45 × 4	**23.** 0.091 × 9	**24.** $1.54 × 2	**25.** 0.345 × 9
26. 12.7 × 49	**27.** 0.375 × 42	**28.** $1.98 × 27	**29.** 0.019 × 35	**30.** $3.45 × 70

Multiplying by 10 or 100 or 1,000

[*Multiplying a decimal*]

A	B	C
6.	2.7 5	0.0 3 4
a. $10 \times 6. = 6\,0.$	**a.** $10 \times 2.75 = 2\,7.5$	**a.** $10 \times 0.034 = 0.3\,4$
b. $100 \times 6. = 6\,0\,0.$	**b.** $100 \times 2.75 = 2\,7\,5.$	**b.** $100 \times 0.034 = 3.4$
c. $1{,}000 \times 6. = 6{,}0\,0\,0.$	**c.** $1{,}000 \times 2.75 = 2{,}7\,5\,0.$	**c.** $1{,}000 \times 0.034 = 3\,4.$

Boxes A–C show an easy way to multiply by 10 or 100 or 1,000. You look at the number to be multiplied and think of the decimal point as moved to the right as many places as there are 0's in the multiplier.

Work this way in writing products for rows 1–5.

	a	b	c
1.	$10 \times 6.1 =$ _____	$100 \times 4.75 =$ _____	$1{,}000 \times 2.875 =$ _____
2.	$100 \times 10 =$ _____	$1{,}000 \times 6.4 =$ _____	$10 \times 0.08 =$ _____
3.	$1{,}000 \times 0.06 =$ _____	$10 \times 46 =$ _____	$100 \times 0.3 =$ _____
4.	$100 \times 0.035 =$ _____	$1{,}000 \times 37.2 =$ _____	$10 \times 3.25 =$ _____
5.	$10 \times 0.5 =$ _____	$100 \times 8.5 =$ _____	$1{,}000 \times 0.9 =$ _____

Meaning of Decimals

1. Is 0.03 larger or smaller than 0.3?

_____

2. Does 4.2 equal 0.42? _____

3. Does 0.85 equal 0.850? _____

4. Is it true that $1.75 = 1\frac{3}{4}$? _____

Write in figures as decimals:

5. Two hundred thousandths _____

6. Five tenths _____

7. Seventy-five hundredths _____

8. Two and nine tenths _____

9. Six thousandths _____

10. Eight hundredths _____

11. Twenty and four thousandths _____

In each row, draw a circle around the smallest number and a square around the largest number.

12.	0.125	1.2	11.5
13.	0.89	0.089	8.09
14.	2.47	27.4	0.742
15.	5.2	0.520	5.02

Copy each of the numbers in rows 12–15 in the column below in which it belongs.

Tenths	Hundredths	Thousandths
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Multiplying by a Decimal

[*The multiplicand a whole number*]

1. Boxes A, B, C, and D show that if one of two factors is a whole number and the other is a decimal, the product has the same fractional unit as the

_____.

2. Boxes C and _____ show that if you change the order of the factors the product is

_____.

A	B	C	D
35	249	85	0.375
× 2.4	× 0.13	× 0.375	× 85
140	747	425	1 875
70	249	595	30 00
84.0,	32.37	255	31.875
or 84		31.875	

Place decimal points correctly in the products below.

3. $1.05 \times 267 = 28035$

4. $0.125 \times 28 = 3500$

5. $0.8 \times 356 = 2848$

6. $2.875 \times 23 = 66125$

In the multiplications below, reverse the factors if it will make the multiplication shorter.

	a	b	c	d
7.	0.75×360	1.6×5	3.005×100	0.375×24
8.	3.04×25	0.86×182	2.125×16	4.2×154
9.	8.14×53	20.3×205	131.6×38	25.75×2
10.	0.046×121	6.4×750	1.25×125	98.5×10

Multiplying Decimals and Mixed Decimals

1 place	1 place	2 places		1 place	2 places	3 places
a. 0.2	× 0.6	= 0.12		c. 0.3	× 0.25	= 0.075
b. 1.4	× 2.1	= 2.94		d. 0.5	× 1.08	= 0.540, or 0.54

1. Use common fractions to check the examples in the box. It is easier, in this check, if you do not cancel. The check for Ex. a shows why.

a. $\frac{2}{10} \times \frac{6}{10} = \frac{12}{100} = 0.12$

b. _____

c. _____

d. _____

When two decimals are multiplied, the product has as many places at the right of one's place as there are decimal places in both factors together.

Find the products. In rows 2–6, multiply without copying the examples.

	a	b	c
2.	0.4 × 0.8 = _____	0.2 × 0.5 = _____	0.9 × 0.3 = _____
3.	0.5 × 0.6 = _____	0.3 × 0.1 = _____	0.7 × 0.6 = _____
4.	0.4 × 1.1 = _____	0.2 × 3.3 = _____	1.3 × 0.2 = _____
5.	2.2 × 0.9 = _____	0.9 × 0.01 = _____	0.06 × 0.6 = _____
6.	0.07 × 0.6 = _____	8.1 × 0.02 = _____	0.9 × 1.04 = _____

	a	b	c	d	e
7.	97.4 ×0.04	2,987.5 ×0.5	569.4 ×0.07	187.5 ×0.9	304.6 ×0.08
8.	$6.95 ×24	123.7 ×0.35	42.08 ×1.3	201.2 ×4.6	190.7 ×50.7
9.	14.9 ×0.18	46.1 ×0.59	28.4 ×0.61	59.3 ×8.4	3.72 ×7.3

Decimals Smaller than Thousandths

[*Meaning*]

A

	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths
a.	1,	3	2	6,	5	4	7	0	8	4	9	7	5
b.													
c.													
d.													
e.													
f.													
g.													
h.													
i.													

Number **a** in chart A is read in this way:

a. One *million* three hundred twenty-six *thousand* five hundred forty-seven AND eighty-four thousand nine hundred seventy-five *millionths*.

1. In chart A, write numbers **b–i** in figures with each figure in its correct place.

b. One hundred fifty-six and fourteen hundredths.

c. Twenty-four and forty ten-thousandths.

d. Twenty-five and thirty-five thousandths.

e. Fifteen hundred-thousandths.

f. One hundred six and five thousandths.

g. One hundred twenty-five thousand two hundred fifty-two millionths.

h. Seventy-two thousand and nine tenths.

i. Five and nine hundred eleven millionths.

2. The name given to a decimal fraction is the name of the last-used _____ _____.

B

124.5	2.020202	6.50
1.245	3.33333	3.6
0.1245	0.000002	12.45
5,140.5	4.3125	9.001
32.005	10.01010	0.125

3. From box B, copy each number into one of the columns below under the heading that tells the name of the decimal fraction.

Numbers in Which the Decimal Fraction Is

Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

4. Write the number 1.6875 in words.

"One and six _____ eight _____ seventy-five _____."

5. Write 156.17667 in words. _____

_____

Multiplying Decimals

[*Products with more than 3 decimal places*]

The examples below show the figures found by multiplying. "Point off" these answers; that is, place each decimal point to show the correct product. Sometimes you will need to write a zero or zeros between the decimal point and the product figures in order to show the correct number of decimal places.

1. $0.7 \times 2.75 =$ 1925
2. $0.25 \times 1.36 =$ 3400
3. $0.375 \times 0.625 =$ 234375
4. $2.05 \times 1.375 =$ 281875
5. $0.12 \times 0.0315 =$ 3780
6. $0.125 \times 9.82 =$ 122750
7. $0.5 \times 0.1875 =$ 9375
8. $0.036 \times 0.9 =$ 324

When two decimals are multiplied, the product has as many decimal places as there are in both factors together.

Find products for rows 9 and 10. Be sure to place decimal points correctly.

	a	b	c	d	e
9.	2.43 × 0.6	1.75 × 0.75	3.106 × 0.15	4.012 × 0.125	1.0375 × 0.25
10.	0.00625 × 0.9	5.125 × 6.7	8.2 × 0.16	0.3125 × 0.50	1.1875 × 0.3

Review of Decimals

[*A. and S.*]

Add. When necessary, write zeros to make the addends like-decimals.

	a	b	c	d	e	f
1.	$3.64 + 1.75	0.375 + 3.333	4.3125 + 0.625	5.002 + 6.02	0.5 + 1.98	9.12 + 0.9

Subtract. First make sure that fractional units are alike.

2.	$0.75 − 0.32	2.6 − 0.32	12.5 − 9.875	8.01 − 5.6	7.3121 − 4.03	2.000 − 1.667

A Test on Decimals

Change each decimal to a common fraction in lowest terms.

1. 0.25 =
2. 0.005 =
3. 0.375 =
4. 0.0075 =
5. 0.01 =
6. 0.125 =

Change to decimals.

7. $\frac{4}{100}$ = _____
8. $\frac{3}{1000}$ = _____
9. $\frac{875}{1000}$ = _____
10. $\frac{106}{10,000}$ = _____

Round to tenths.

11. 3.84 _____
12. 1.16 _____
13. 0.98 _____
14. 0.07 _____

Round to hundredths.

15. 0.206 _____
16. 2.125 _____
17. 3.663 _____
18. 0.005 _____

19. Write the name of the place of each figure in the number 2,148.3675.

Figure	Place
2	_____
1	_____
4	_____
8	_____
3	_____
6	_____
7	_____
5	_____

20. For the number 4,075.1638 write

a. the figure in one's place ____
b. the figure in tenth's place ____
c. the figure in thousandth's place ____
d. the figure in ten-thousandth's place ____
e. the figure in hundred's place ____
f. the figure in ten's place ____

21. Write 16.00833 in words: _____

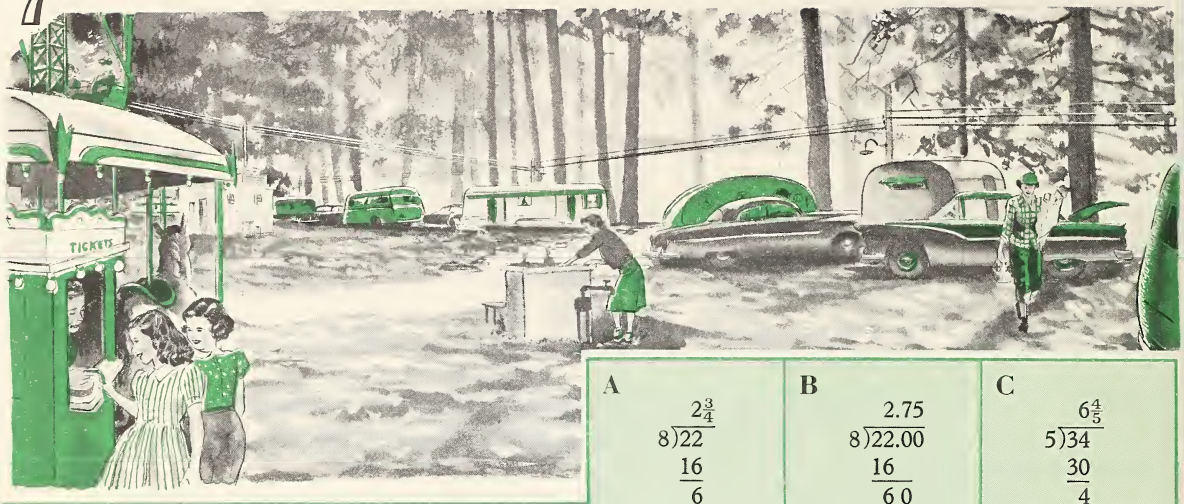
_____

_____

Write just the answers. Be careful about decimal points.

	a	b	c
22.	0.2 + 0.1 = _____	0.9 + 0.2 = _____	0.001 × 2.5 = _____
23.	1.7 + 0.6 = _____	1.5 + 0.8 = _____	0.003 × 0.1 = _____
24.	0.9 − 0.5 = _____	0.13 − 0.07 = _____	0.05 × 0.03 = _____
25.	1.6 − 0.7 = _____	1.4 − 0.5 = _____	0.1 − 0.08 = _____
26.	0.1 × 0.01 = _____	0.02 × 0.4 = _____	10 × 4.75 = _____

7 Vacation in Trailer Park



A

$$8\overline{)22}\quad 2\tfrac{3}{4}$$
$$\begin{array}{r} 16 \\ \hline 6 \end{array}$$

$\frac{6}{8} = \frac{3}{4}$

B

$$8\overline{)22.00}\quad 2.75$$
$$\begin{array}{r} 16 \\ \hline 60 \\ 56 \\ \hline 40 \\ 40 \end{array}$$

C

$$5\overline{)34}\quad 6\tfrac{4}{5}$$
$$\begin{array}{r} 30 \\ \hline 4 \end{array}$$

D

$$5\overline{)34.0}\quad 6.8$$
$$\begin{array}{r} 30 \\ \hline 40 \\ 40 \end{array}$$

In boxes A and C, we used fractions to show the division of the remainders. In boxes B and D, we expressed the dividends in decimal form and kept on dividing, so the quotients show decimal fractions.

Find answers for the following problems. Let your quotients show decimal fractions.

1. The Chapmans spent their summer vacation in their trailer. To reach Trailer Park, they drove 279.3 mi. the first day and 287.7 mi. the second day.

a. They drove _____ mi. in all.

b. The daily average was _____ mi.

2. They used 45 gal. of gasoline on the trip (Ex. 1a). How many miles, on the average, did they go on a gallon?

_____

3. At Trailer Park, all trailers are 90 ft. from the lake. Gary Chapman paced off this distance so that he could estimate the length of his step. (The pace is the length of one step from the toe of one foot to the heel of the other.) Gary took 50 paces. What is the average length of his step?

_____

4. Sandra Chapman took 36 paces in 90 ft. How long is Sandra's pace?

_____

5. Sandra and Kendra rode on the merry-go-round at the park. They bought a strip of tickets at 10 rides for 75¢.

a. How much does one ride cost on a strip ticket?

_____

b. They each took 2 rides. How much more would their rides have cost if they had bought single 10¢ tickets?

_____

6. Mr. Chapman paid $15.75 for 3 weeks' rent of the space in the park. How much was this by the week?

_____

7. The Chapmans spent $17.50 for food one week. What was the average daily expense for food?

_____

Changing Any Fraction to a Decimal

[*Whole number ÷ larger whole number*]

A

$\frac{1}{4} = 1 \div 4 = 0.25$

$$4\overline{)1.00}\quad 0.25$$

8
20
20

B

$\frac{3}{8} = 3 \div 8 = 0.375$

$$8\overline{)3.000}\quad 0.375$$

24
60
56
40
40

C

$\frac{1}{6} = 1 \div 6 = 0.16\frac{2}{3}$, or 0.17

$$6\overline{)1.00}\quad 0.16\tfrac{2}{3}$$

6
40
36
4

$\frac{4}{6} = \frac{2}{3}$

$$6\overline{)1.000}\quad 0.166$$

6
40
36
40
36
4

Be sure that you understand how the common fractions in boxes A–C are changed to decimals. Then change the following common fractions to decimal fractions. Use as many 0's in the dividend after the decimal point as are needed to make the division come out even.

1. $\frac{5}{8}$ = _____ 2. $\frac{7}{20}$ = _____ 3. $\frac{9}{32}$ = _____ 4. $\frac{17}{25}$ = _____

$8\overline{)5.}$

Change these fractions to 2-place decimals. Give each answer in two ways—(1) as a 2-place decimal with the remainder in a common fraction; and (2) rounded to hundredths.

5. $\frac{6}{7}$ = _____ or _____ 6. $\frac{5}{12}$ = _____ or _____ 7. $\frac{7}{15}$ = _____ or _____

Dividing a Decimal by a Whole Number

A

$\frac{3}{4} = 0.75$
$1.50 = 1.50$
$+\frac{4}{5} = 0.80$
3.05

$1.01\frac{2}{3}$
$3\overline{)3.05}$
3
05
3
2

1.016
$3\overline{)3.050}$
3
05
3
20
18
2

$3.05 \div 3 = 1.01\frac{2}{3}$, or 1.02 to nearest hundredth

B

$0.12 \div 3 = ?$

0.04
$3\overline{)0.12}$
12

C

$1.7 \div 5 = ?$

0.34
$5\overline{)1.70}$
15
20
20

D

$0.07 \div 9 = ?$

0.0077
$9\overline{)0.0700}$
63
70
63
7

$0.07 \div 9 = 0.008$, to the nearest thousandth

1. Sally bought three candy bars. Their weights were $\frac{3}{4}$ oz., 1.50 oz., and $\frac{4}{5}$ oz. Find the average weight of a bar.

Box ____ shows that the average weight is _____ oz., or about _____ oz.

2. Box B shows that $0.12 \div 3 =$ _____.

3. In box C, explain why the dividend was changed to 1.70 _____

_____

_____

4. In box D, why were two 0's used in the dividend after the 7?

_____

_____

In the examples below, round the quotient to the nearest thousandth if the division does not come out even in ten-thousandth's place or before that.

5. $5\overline{)27.4}$

6. $6\overline{)0.93}$

7. $9\overline{)362.25}$

8. $7\overline{)0.0812}$

9. $12\overline{)0.07}$

10. $25\overline{)2.8}$

11. $34\overline{)0.549}$

12. $48\overline{)0.3125}$

Multiplying and Dividing by 10 or 100 or 1,000

Notice that the multiplications in box A are reversed by the divisions in box B.	A	B
	$10 \times 4.75 = 47.5$	$47.5 \div 10 = 4.75$
	$100 \times 4.75 = 475.$	$475 \div 100 = 4.75$
	$1{,}000 \times 4.75 = 4{,}750.$	$4{,}750 \div 1{,}000 = 4.75$

Study the boxes above. Then work Ex. 1–6.

1. To multiply by 10, move the decimal point 1 place to the right. $10 \times 3.5 =$ _____
2. To multiply by 100, move the decimal point ____ places to the _____. $100 \times 3.5 =$ _____
3. To multiply by 1,000, move the decimal point ____ places to the _____. $1{,}000 \times 3.5 =$ _____
4. To divide by 10, move the decimal point 1 place to the left. $3.5 \div 10 =$ _____
5. To divide by 100, move the decimal point ____ places to the _____. $3.5 \div 100 =$ _____
6. To divide by 1,000, move the decimal point ____ places to the _____. $3.5 \div 1{,}000 =$ _____

Write the quotients for Ex. 7–13.

Number	Divided by 10	Divided by 100	Divided by 1,000
7. 250.8	_____	_____	_____
8. 0.75	_____	_____	_____
9. 22.67	_____	_____	_____
10. 18	_____	_____	_____
11. 2.125	_____	_____	_____
12. 42.6	_____	_____	_____
13. 4.9	_____	_____	_____

Write the products for Ex. 14–20.

Number	Multiplied by 10	Multiplied by 100	Multiplied by 1,000
14. 0.06	_____	_____	_____
15. 2.1	_____	_____	_____
16. 30.05	_____	_____	_____
17. 7.624	_____	_____	_____
18. 120.8	_____	_____	_____
19. 0.1	_____	_____	_____
20. 42.33	_____	_____	_____

Dividing by a Money Number

1. For her party, Dianne spent $1.25 for candy. If it cost $0.50 a pound, how many pounds did she buy?

_____

$\$0.50\overline{)\$1.25} = \frac{1.25}{0.50}$

$\frac{100 \times 1.25}{100 \times 0.50} = \frac{125}{50}$

$50\overline{)125}$ $2\frac{1}{2}$

100

25

Change each example to one in which the divisor is a whole number. Write just the example; do not divide.

$\$0.23\overline{)\$1.75} =$ _____ 4. $\$1.98\overline{)\$10.95} =$ _____ 6. $\$2.30\overline{)\$12} =$ _____

$\$0.05\overline{)\$0.85} =$ _____ 5. $\$0.10\overline{)\$1} =$ _____ 7. $\$0.48\overline{)\$15.60} =$ _____

Dividing by a Decimal Fraction

[*Divisor: tenths; hundredths; thousandths*]

A	B	C	D
$0.3\overline{)6} = 3\overline{)60}$ 20 $3\overline{)60}$ 6 0	$0.04\overline{)0.3} = 4\overline{)30}$ 7.5 $4\overline{)30.0}$ 28 20 20	$0.012\overline{)3.6} = 12\overline{)3{,}600}$ 300 $12\overline{)3{,}600}$ 36 00	$0.08\overline{)0.006} = 8\overline{)0.6}$ 0.075 $8\overline{)0.600}$ 56 40 40

Study the work in boxes A–D. Then, in rows 1–4, write each example again with the divisor changed to a whole number, and divide. If the division does not come out even by thousandth's place, round the quotient to the nearest hundredth.

	a	b	c
1.	$0.6\overline{)9}$	$0.09\overline{)1.89}$	$0.8\overline{)0.012}$
2.	$0.1\overline{)3.24}$	$0.04\overline{)23.6}$	$0.3\overline{)7.26}$
3.	$0.009\overline{)0.9}$	$0.2\overline{)1.5}$	$0.205\overline{)4.1}$
4.	$0.78\overline{)6.5}$	$0.875\overline{)1.25}$	$0.24\overline{)1.6}$

Dividing by a Mixed Decimal

In dividing by a mixed decimal, you work just as you do when the divisor is a decimal fraction. First change the example so that the divisor is a whole number. Study the work in boxes A–C until you are sure that you understand it.

Divide in Ex. 1–6. Round quotients to the nearest hundredth if they do not come out even by thousandth's place.

A

$34 \div 1.5 = ?$

```
      22.666
15)340.000
   30
   40
   30
   10 0
    9 0
    1 00
      90
      100
       90
       10
```

Ans.: 22.67

B

$8.019 \div 1.03 = ?$

```
       7.785
103)801.900
   721
    80 9
    72 1
     8 80
     8 24
      560
      515
       45
```

Ans.: 7.79

C

$0.575 \div 3.25 = ?$

```
      0.176
325)57.500
   32 5
   25 00
   22 75
    2 250
    1 950
      300
```

Ans.: 0.18

1. $1.6\overline{)9.02}$

2. $1.134\overline{)3.92}$

3. $2.04\overline{)9.125}$

4. $1.33\overline{)2.66}$

5. $1.01\overline{)7.375}$

6. $4.0\overline{)0.86}$

Joe's older brother told him about a useful relationship in the circle.

To find the distance around a circle, you can multiply the distance across it through the center by 3.14.

1. Find the distance around a circle if the distance across it through the center is 5 in.

_____

2. Joe used the circle relationship to find the distance around the stump of a tree that was 2 ft. 9 in. across. Express 2 ft. 9 in. as a mixed decimal and find the distance around the stump, to the nearest 0.1 ft.

_____

3. A meter is a unit of length that is about 39.37 in. A millimeter is 0.001 meter. To the nearest 0.01 in., how many inches does a millimeter equal?

_____

4. A box of 9.00″ by 9.75″ cleansing tissues costs 27¢. A 25¢ box contains the same number of sheets 8.75″ by 9.75″.

a. Find the area of each size of tissue (to the nearest 0.01 sq. in.).

27¢ size _____; 25¢ size _____

b. How many more square inches are there in one of the larger tissues than in one of the smaller tissues?

_____

5. A gram is a small unit of weight that equals approximately 0.03527 oz. To the nearest hundredth of an ounce, how many ounces equal a gram?

_____

6. The difference (called the "spread") between the price per quart paid to the farmer for milk and the price paid by the consumer is 14.18 cents today. This spread was 9.55 cents eight years ago.

a. How much has the spread increased during the eight years?

_____

b. What has been the average yearly increase in the spread? (Round your answer to the nearest hundredth of a cent.)

_____

7. Small fence pickets cost \$0.06½ each if bought at the lumber yard, and 7¢ if delivered. Mr. Burke wanted 250 pickets. How much would he save by buying the pickets at the yard?

_____

8. In his nature-study class, Toby learned that the house sparrow weighs about 1.05 ounces, and the song sparrow weighs only about 0.88 ounce.

a. The house sparrow is about _____ oz. heavier than the song sparrow.

b. The house sparrow is about _____ times as heavy as the song sparrow. (Round your answer to the nearest tenth.)

c. The song sparrow weighs about 0.____ as much as the house sparrow.

Three Kinds of Problems in M. and D.

In working with problems, remember the three kinds of problems in multiplication and division. You learned about these with common fractions.

In the boxes below, supply the missing words and numbers.

Show your work in the column at the right.

I. Finding the product. $0.07 \times 15 = n$ $n = 0.07 \times 15 = 1.05$	You know the two factors. To find the product, you _____.	15 $\times 0.07$ 1.05
II. Finding the factor which shows a relationship, or ratio; that is, how many times or what part of. $n \times 15 = 1.05$ $n =$ _____ $\div$ _____ $=$ _____	You know the product and one factor. To find the other factor, you *divide*.	
III. Finding the other factor when the ratio factor is given. $0.07 \times n = 1.05$ $n =$ _____ $\div$ _____ $=$ _____	You know the product and one factor. To find the other factor, you _____.	

Find **n**. Show all your work.

a	b	c
$0.24 \times 8 = n$; $n =$ _____	$n = 0.60 \times 0.5$; $n =$ _____	$n \times 30 = 6$; $n =$ _____
$n \times 10 = 5$; $n =$ _____	$0.50 \times 9 = n$; $n =$ _____	$4 \times n = 2$; $n =$ _____
$n = 0.15 \times 3$; $n =$ _____	$0.25 \times n = 4$; $n =$ _____	$n \times 60 = 15$; $n =$ _____
$0.35 \times n = 7$; $n =$ _____	$n \times 0.6 = 1.8$; $n =$ _____	$0.04 \times n = 3$; $n =$ _____

Review of Decimals

1. Margaret got the quotient \$0.19633 when she divided a money number. To the nearest cent, how would she express this quotient?

_____¢

Write in figures:

2. Nine thousandths _____

3. Forty and six tenths _____

Write as decimal parts of a dollar:

4. **a.** $38¢ = \$$_____ **b.** $89\frac{1}{5}¢ = \$$_____

5. **a.** $4\frac{1}{2}¢ = \$$_____ **b.** $5¢ = \$$_____

Change to decimals to the nearest thousandth.

6. $\frac{3}{5} = \frac{\quad}{10} = \frac{\quad}{1000} =$ _____

7. $\frac{7}{8} = 7 \div 8 =$ _____

8. $\frac{5}{16} =$ _____ 9. $\frac{1}{6} =$ _____

Space for Work

Write only the answers for rows 10–13 below.

	a	b	c
10.	$10 \times 3.6 =$ _____	$1.9 \div 100 =$ _____	$0.52 \div 1{,}000 =$ _____
11.	$0.4 \div 100 =$ _____	$0.15 \times 100 =$ _____	\$7.45 ÷ 100 = _____
12.	$0.03 \times 1{,}000 =$ _____	\$8.32 ÷ 10 = _____	$16 \times 100 =$ _____
13.	$5.8 \times 100 =$ _____	$1{,}000 \times \$3.75 =$ _____	$48 \div 1{,}000 =$ _____

Point off (that is, place the decimal point) to show the correct product.

14. $0.07 \times 95.2 =$ 6 6 6 4

15. $15 \times 1.5 =$ 2 2 5

16. $2.75 \times \$100 =$ \$ 2 7 5 0 0

17. $3.2 \times 5.08 =$ 1 6 2 5 6

18. $0.2 \times 0.375 =$ 7 5 0

Round to the nearest whole number.

19. 3.3 _____ 2.49 _____

20. 159.95 _____ 80.1 _____

21. 17.2 _____ 65.89 _____

22. 38.07 _____ 230.81 _____

Change to common fractions in lowest terms.

23. 0.3 =

24. 0.125 =

25. 0.48 =

26. 0.3125 =

27. 0.075 =

28. 0.01 =

29. 0.50 =

All Kinds of Numbers

Add, subtract, or multiply. Watch the signs!

	a	b	c	d	e
1.	$\begin{array}{r} 324 \\ 106 \\ +55 \\ \hline \end{array}$	$\begin{array}{r} 1{,}930 \\ 221 \\ +3{,}875 \\ \hline \end{array}$	$\begin{array}{r} 86 \\ 158 \\ +750 \\ \hline \end{array}$	$\begin{array}{r} 756 \\ 2{,}152 \\ +1{,}009 \\ \hline \end{array}$	$\begin{array}{r} 2.125 \\ 3.875 \\ +0.50 \\ \hline \end{array}$
2.	$\begin{array}{r} 6\frac{3}{8} \\ +4\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 2\frac{5}{6} \\ +8\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{1}{2} \\ +5\frac{2}{3} \\ \hline \end{array}$	$\begin{array}{r} 1\frac{1}{6} \\ +9\frac{5}{8} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{7}{16} \\ +3\frac{3}{8} \\ \hline \end{array}$
3.	$\begin{array}{r} 587 \\ -398 \\ \hline \end{array}$	$\begin{array}{r} 2{,}000 \\ -956 \\ \hline \end{array}$	$\begin{array}{r} \$16.52 \\ -8.85 \\ \hline \end{array}$	$\begin{array}{r} 13{,}406 \\ -7{,}527 \\ \hline \end{array}$	$\begin{array}{r} 6.805 \\ -3.96 \\ \hline \end{array}$
4.	$\begin{array}{r} 7\frac{1}{8} \\ -5\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 16\frac{2}{3} \\ -9\frac{1}{5} \\ \hline \end{array}$	$\begin{array}{r} 43\frac{3}{8} \\ -27\frac{7}{12} \\ \hline \end{array}$	$\begin{array}{r} 75\frac{3}{16} \\ -69\frac{9}{32} \\ \hline \end{array}$	$\begin{array}{r} 25\frac{3}{5} \\ -18\frac{3}{10} \\ \hline \end{array}$
5.	$\begin{array}{r} 236 \\ \times 16 \\ \hline \end{array}$	$\begin{array}{r} 1.09 \\ \times 55 \\ \hline \end{array}$	$\begin{array}{r} 62.8 \\ \times 32 \\ \hline \end{array}$	$\begin{array}{r} 1{,}728 \\ \times 1.5 \\ \hline \end{array}$	$\begin{array}{r} 35.125 \\ \times 0.18 \\ \hline \end{array}$

6. $\frac{3}{4} \times \frac{2}{3} =$

7. $\frac{5}{8} \times \frac{4}{5} \times \frac{4}{5} =$

8. $\frac{1}{2} \times \frac{5}{6} \times \frac{8}{15} =$

9. $2\frac{1}{2} \times \frac{3}{5} \times 8 =$

10. $\frac{1}{2} \times 3\frac{1}{7} \times 7 \times 7 =$

Divide. In Ex. 11 and 12, round quotients to the nearest hundredth.

11. $23\overline{)7.89}$

12. $35\overline{)0.597}$

13. $\frac{2}{3} \div \frac{1}{2} =$

14. $3\frac{1}{2} \div 2 =$

Division with Decimals

At the right are examples that illustrate all the kinds of work in division with decimals. Just as with common fractions, some quotients tell **how many times** and some tell **what part of**.

Without dividing, write a check mark (✓) in the proper column to tell whether the quotient will be a how-many-times number or a what-part-of number.

Now work the examples in the boxes below. When a quotient goes beyond thousandth's place, round it to the nearest hundredth.

When you have finished dividing in each example, look back at your check mark and see whether the quotient is the kind of number you thought it would be. If it is not, try to find and correct your mistake.

Example	Quotient will show how many times	Quotient will show what part of
1. $23 \div 8$	_____	_____
2. $3 \div 4$	_____	_____
3. $0.47 \div 7$	_____	_____
4. $12.6 \div 5$	_____	_____
5. $5.08 \div 9$	_____	_____
6. $34 \div 0.8$	_____	_____
7. $0.875 \div 0.25$	_____	_____
8. $0.36 \div 0.75$	_____	_____
9. $12.35 \div 0.65$	_____	_____
10. $17 \div 2.125$	_____	_____
11. $6 \div 14.8$	_____	_____
12. $0.5 \div 3.2$	_____	_____
13. $9.25 \div 7.5$	_____	_____
14. $4.02 \div 8.1$	_____	_____

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.
11.	12.	13.	14.	

Right or Wrong?

Mark ✓ in the box if a statement is correct, and X if it is wrong. Read carefully, and think!

When a statement in the left column is wrong, write its exercise number on one of the lines below and explain why it is wrong.

1. If you know a product and one of its two factors, you multiply to find the other factor. ☐

2. The name of a decimal fraction is the name of the last decimal place used. ☐

3. In a division example, any remainder is always smaller than the divisor. ☐

4. If you write two zeros after a whole number, you have multiplied the number by 100. ☐

5. If you know the number left and the number at first, you subtract to find the number gone. ☐

6. The Roman number that means 5 is X. ☐

7. If you put a zero between the decimal point and the tenth's figure in a decimal fraction, you have divided the fraction by 10. ☐

8. Like-fractions must have the same numerator. ☐

9. In dividing a decimal by a decimal, you first multiply both dividend and divisor by a number that makes the dividend a whole number. ☐

10. The name of a decimal fraction that has three places is "thousandths." ☐

11. To multiply a number by 10, you can think of the decimal point as moved one place to the right. ☐

12. To check a division example, you multiply the quotient and the divisor and add the remainder. ☐

13. A whole number ending in two zeros is always 10 times as large as a whole number ending in one zero. ☐

14. Decimal fractions which have the same number of decimal places are called "like-fractions." ☐

15. You point off the product in multiplying decimals by giving the product as many decimal places as there are in the multiplicand. ☐

Short Division

[*Even and uneven division*]

A		B		C	
Long Way	**Short Way**	**Long Way**	**Short Way**	**Long Way**	**Short Way**
212 4)848 8 4 4 8 8	212 4)848	132, R3 7)927 7 22 21 17 14 3	132, R3 7)927	$79\frac{1}{3}$ 6)476 42 56 54 2	$79\frac{1}{3}$ 6)476

1. In boxes A, B, and C, draw a big ring around all work that you *think* but *do not write* when you divide in the short way.

2. Write the quotient from box B with the remainder in a fraction. _____

3. The remainder in box C is _____, so we could write the answer as _____, R____.

4. In box C, where does the $\frac{1}{3}$ come from? _____

Use short division for the examples in rows 5–11.

	a	b	c	d	e	f	g
5.	3)63	5)510	4)88	6)120	7)714	9)189	5)355
6.	4)408	7)147	8)856	9)639	8)168	3)249	3)219
7.	5)105	7)749	6)186	4)128	5)545	6)648	4)164

Write any remainder in a fraction in best form.

8.	4)34	6)19	8)25	9)51	4)23	9)39	8)57
9.	9)68	5)16	4)18	8)33	9)84	3)19	7)65
10.	4)17	8)75	6)29	7)58	6)43	9)60	5)49
11.	5)27	7)34	9)75	6)57	5)38	8)42	6)35

The following examples are the kind of subtraction you often find in division examples. Write remainders.

	a	b	c	d	e
12.	25 − 18 = _____	33 − 28 = _____	41 − 32 = _____	63 − 56 = _____	71 − 66 = _____
13.	62 − 54 = _____	52 − 45 = _____	34 − 27 = _____	20 − 12 = _____	54 − 48 = _____
14.	71 − 64 = _____	44 − 36 = _____	22 − 18 = _____	51 − 49 = _____	31 − 24 = _____

D $8\overline{)550}$ = 68, R6	**F** 4.11 ÷ 6 = ?	**G** To the nearest 0.01, 2.15 ÷ 0.9 = ?	**H** $\frac{375}{5} = 75$
E $7\overline{)3{,}204}$ = 457, R5	$6\overline{)4.110}$ = 0.685	$9\overline{)21.500}$ = 2.388 . . ., or 2.39	**I** $\frac{2}{7} = 0.285\ldots$, or 0.29

15. Write the answers for Ex. D and E with the remainders in fractions.

Ex. D _____ Ex. E _____

16. The dots in Ex. G and I show that the division does not come out even. The fifth quotient figure in Ex. G would be ____.

17. Work Ex. H and I in the long way and draw a ring around the part that you do not write when you work in the short way.

$5\overline{)375}$ $7\overline{)2}$

Divide, using short division. Write any remainder with R.

	a	b	c	d	e	f
18.	$8\overline{)235}$	$6\overline{)500}$	$9\overline{)320}$	$7\overline{)541}$	$8\overline{)705}$	$4\overline{)312}$
19.	$7\overline{)601}$	$9\overline{)502}$	$4\overline{)110}$	$6\overline{)522}$	$5\overline{)247}$	$6\overline{)536}$

Rewrite examples if necessary. If any quotient is not even by hundredth's place, round to the nearest tenth.

	a	b	c	d
20.	$6\overline{)2{,}058}$	$0.4\overline{)1.01}$	$0.6\overline{)5}$	$5\overline{)7.32}$
21.	$0.8\overline{)30.5}$	$7\overline{)3{,}265}$	$9\overline{)4{,}310}$	$3\overline{)20.4}$
22.	$7\overline{)0.58}$	$0.3\overline{)11.85}$	$0.5\overline{)3.45}$	$8\overline{)0.7}$

Change to decimals, rounded to the nearest hundredth if the division is uneven. Use short division.

	a	b	c	d	e
23.	$\frac{1}{8} =$	$\frac{10}{3} =$	$\frac{7}{9} =$	$\frac{3}{5} =$	$\frac{13}{6} =$
24.	$\frac{4}{7} =$	$\frac{1}{4} =$	$\frac{14}{5} =$	$\frac{15}{8} =$	$\frac{3}{8} =$

Making and Solving Problems

For each exercise, write a question that will make a problem. Draw a ring around A. or S. or M. or D. to show whether you will add, subtract, multiply, or divide to solve the problem you have made. Then solve, and write the answer.

1. Joe telephoned Bill at 10 minutes past 3 that he would meet him in half an hour.

Question: _____

Solve by: A.? S.? M.? D.? Answer: _____

2. Kathie's mother paid $5.96 for a set of 4 small tables.

Question: _____

Solve by: A.? S.? M.? D.? Answer: _____

3. Sylvia has saved $14.25. She wants to buy a radio that costs $19.75.

Question: _____

Solve by: A.? S.? M.? D.? Answer: _____

4. Bill weighed 112 lb. at the beginning of his vacation. He weighed 123 lb. when he went back to school.

Question: _____

Solve by: A.? S.? M.? D.? Answer: _____

5. For the trip to the lake, Mrs. Barber bought each of her four children a toy sailboat. The boats cost 35¢ each.

Question: _____

Solve by: A.? S.? M.? D.? Answer: _____

6. Mrs. Knight paid $79.95 for a stove and $8 for delivery charges. At another store, which delivers without charge, the same stove was priced at $98.75.

Question: _____

_____

Solve by: A.? S.? M.? D.? Answer: _____

Space for Work

Review of Fractions and Decimals

Add, subtract, multiply, or divide, as the signs direct. Write just the answers on this page.

	a	b	c	d	e
1.	$2\frac{3}{4} + \frac{1}{2} =$	$\frac{2}{3} + 4\frac{1}{4} =$	$\frac{7}{8} + \frac{1}{3} =$	$6\frac{5}{16} + \frac{5}{8} =$	$\frac{4}{5} + 2\frac{3}{4} =$
2.	$3\frac{1}{2} - 2\frac{1}{8} =$	$8\frac{3}{4} - 6\frac{7}{8} =$	$2\frac{1}{3} - 1\frac{2}{3} =$	$12\frac{1}{2} - 8\frac{5}{8} =$	$9\frac{2}{3} - 5\frac{1}{2} =$
3.	$4 \times 0.3 =$	$0.2 \times 0.6 =$	$0.01 \times 7 =$	$3 \times 0.05 =$	$6 \times 0.001 =$
4.	$3\overline{)16.5}$	$0.2\overline{)6.84}$	$0.04\overline{)16}$	$8\overline{)0.24}$	$0.001\overline{)2}$

Multiply or divide, as directed. Show all your work.

	a	b	c
5.	$\frac{3}{4} \times 1\frac{1}{2} =$	$2\frac{1}{4} \times 1\frac{2}{3} =$	$4\frac{3}{5} \times 25 =$
6.	$3\frac{1}{8} \div 5 =$	$\frac{3}{8} \div \frac{9}{16} =$	$5\frac{3}{5} \div 1\frac{2}{5} =$

Change to decimals. Show how you work.

7.	$\frac{3}{4} =$	$\frac{7}{8} =$	$\frac{5}{16} =$

Change to common fractions. Show each step you take.

8.	0.25 =	0.375 =	0.0875 =

Round to the nearest hundredth.

	a	b	c	d
9.	14.375 _____	0.1872 _____	2.250 _____	3.502 _____

Round to the nearest whole number.

0.	$2\frac{3}{4}$ _____	$14\frac{1}{4}$ _____	$\frac{72}{100}$ _____	$24\frac{13}{16}$ _____

Find the value of **n**. (Show how you find **n**.)

1.	$n \div 2 = 3\frac{1}{2}$; n =	14.	$0.03 + n = 1.08$; n =
2.	$n = 1\frac{1}{4} \times 2$; n =	15.	$n - 0.5 = 2.3$; n =
3.	$\frac{3}{4} \div n = 1\frac{1}{2}$; n =	16.	$0.75 - n = 0.5$; n =

Testing What You Have Learned

[*Cumulative Review*]

Write these numbers in figures:

1. One hundred thousand six hundred fifty-seven. _____

2. Two million three hundred forty-six thousand. _____

3. Three hundred fifty and twenty-five hundredths. _____

4. Six and five ten-thousandths. _____

Find the sums.

	a	b	c
5.	32,189 +6,057	$125.75 +256.95	211,356 +809,798
6.	0.98 +1.3	2.005 +3.6	12,875 +9,095
7.	$18\frac{3}{4}$ $+9\frac{1}{8}$		
8.		$2\frac{1}{2}$ $+16\frac{2}{3}$	

Find the remainders.

	a	b	c
9.	15,782 −6,295	$100.80 −56.95	275,000 −9,875
10.	3.06 −1.125	723.4 −548.6	2.5 −1.75
11.	$26\frac{1}{3}$ $-17\frac{1}{2}$		
12.		$12\frac{9}{16}$ $-11\frac{7}{8}$	

13. Write as decimals. If you cannot remember the equivalents, use short division.

a. $\frac{5}{6}$ = b. $\frac{3}{8}$ =

14. Round to the nearest hundredth.

a. 2.386 _____ c. 0.1054 _____

b. 5.1819 _____ d. 0.0071 _____

Multiply in rows 15–18.

	a	b	c
15.	232 ×18	$1.95 ×9	75 ×36
16.	$1\frac{1}{8} \times 2\frac{2}{3} =$		
17.	$3\frac{1}{3} \times 1\frac{4}{5} =$		
18.	154 ×0.05	28 ×1.6	30.6 ×0.015

Divide. Write the remainders in fractions.

	a	b
19.	$27\overline{)3,327}$	$18\overline{)4,938}$

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